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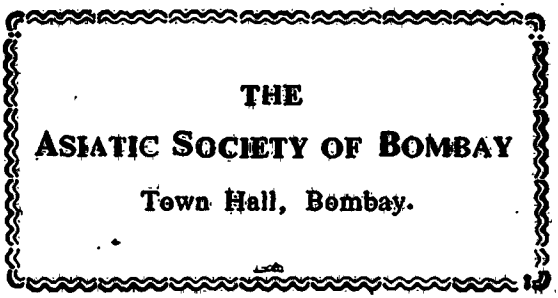

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Vol. XIX. Part III.

THE

TRANSACTIONS

OF THE

BOMBAY GEOGRAPHICAL SOCIETY.

From January 1871 *to December* 1873.

(ON ITS AMALGAMATION WITH THE B. B. R. ASIATIC SOCIETY.)

(EDITED BY THE SECRETARY.)

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Bombay:

PRINTED AT THE

EDUCATION SOCIETY'S PRESS, BYCULLA.

1874.

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Particulars of FIXED DEPOSITS *with the Mercantile Bank of India, London, and China.*

Dr.

1870					Rs.	A.	P.
October 31st	To amount bearing interest at 6 per cent. per annum due 25th January 1871	Rs.	2,279	0 1			
	Do. do.	,,	600	0 0			
	Do. at 5 per cent. due 26th July 1871	,,	700	0 0			
					3,579	0	1

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1870					Rs.	A.	P.
October 31st	By Balance of the Premchand Raichand Donation account	Rs.	2,617	2 5			
	,, Do. the W. E. Frere Portrait Fund...	,,	301	0 11			
	,, Society's money	,,	660	12 0			
					3,579	0	1

Errors Excepted.

J. BURGESS, F.R.G.S.,
Offg. Honorary Secretary, Bombay Geographical Society.

SESSION 1871-72.

FIRST MEETING, *July 27th*, 1871.

The ordinary Monthly Meeting of the Bombay Geographical Society was held in their Rooms, Town Hall, on Thursday the 27th July 1871, at half-past 4 P.M.

Present.—The Honourable Mr. Justice Gibbs, C.S., *President*, in the Chair; Bháu Dájí, Esq., G.G.M.C., Honorary M.R.A.S., *Vice-President;* Commander G. T. Robinson, late I.N., *Vice-President;* Máṇikjí Kharsetjí, Esq., F.R.G.S., F.R.S.N.A.; Atmárám Páṇdurang, Esq., G.G.M.C.; J. M. Maclean, Esq.; Lieutenant W. L. Searle, late I.N., F.R.A.S.; J. Burgess, Esq., F.R.G.S., M.R.A.S.; Prof. F. J. Candy, M.A.; Barjorjí Sorábjí Ashburner, Esq.; J. Firth, Esq., F.R.G.S.; Dhirajrám Dalpatrám, Esq., G.G.M.C.; R. G. Walton, Esq., C.E., F.R.G.S., F.A.S.L.; W. Sowerby, Esq., C.E., F.G.S.; L. Reid, Esq., C.S.; The Rev. J. S. S. Robertson, M.A., F.R.G.S., M.R.A.S., *Members;* and Lieutenant Henry Morland, late I.N., F.R.G.S., F.R.A.S., *Honorary Secretary.*

Visitors.—Dr. Thomas Blaney; G. R. Vencatacooboo Moodliar, Esq.; and Jehángirjí Máṇikjí Kharsetjí, Esq.

The Minutes of the last Meeting having been read and confirmed, Captain Morland read the following Resolutions from the Minutes of a Meeting of the Committee held on the 30th March last:—

1. Resolved that the subscription for Non-Resident Members be fixed at Rs. 5 per annum, and to have retrospective effect: and that they be informed and charged accordingly.

2. Resolved that copies of the Index to the first seventeen volumes of the Transactions, combined with Catalogues of Books and Maps, be forwarded to all the Resident Members who have not already received them, and that extra copies of the same be issued to new Members, and to those requiring second copy, at the rate of Rs. 6 per copy.

3. Resolved that Rs. 800 from the Premchand Raichand Donation be appropriated for the publication of a Supplementary Catalogue, to be labelled with the donor's name.

4. Resolved that the Native Princes and Chiefs of the Dakhan and Gujarát be invited to be Life Members of the Society.

5. Resolved that the Clerk to the Society be restored to his former salary up to 1st June next, with retrospective effect.

6. Resolved, also, that Messrs. Firth and Dhirajrám Dalpatrám be requested to audit the Society's cash accounts for last year.

Elections.—Rámkrishna Gopál Bhándárkar, Esq., M.A.; Vináyakráo Rámchandraji, Esq.; Thomas Ormiston, Esq., C.E., M.I.C.E., and Captain John Dixon.

Members proposed.—F. B. Girdlestone, Esq.; T. W. Wood, Esq., and Kharsetjí Máṇikjí Kharsetji, Esq., B.A., Oxford.

Captain Morland then remarked that he had applied to the Bombay Government for the Society being favoured with one spare copy of all the publications which were lying unused in the Marine Stores at H.M.'s Dockyard, and that he had met with a liberal response. Among the numerous Donations laid on the table, there were 74 works on miscellaneous subjects sent by the Marine Storekeeper, in conformity with the Government Resolution sanctioning their issue. There were also 62 works received from the Government of India, Home and Foreign Departments; the Government of Madrás; the Government of the N. W. Provinces, and other literary and scientific institutions of the world. He added that the Surveyor General of India had also, with his usual kindness, forwarded, for the acceptance of the Society, 65 Maps in exchange for the complete set of the Transactions already furnished to him. He then laid before them the following Donations, received since the last Meeting :—

FROM THE GOVERNMENT OF BOMBAY, THROUGH THE MARINE STOREKEEPER.

1. Marsden's Malayan Dictionary, 1812.
2. Marsden's Malayan Grammar, 1812.
3. Shakespear's Hindustáni and English Dictionary, 1820.
4. Shakespear's Grammar of the Hindustáni Language, 1826.
5. Roebuck's English and Hindustáni Naval Dictionary of Technical Terms and Sea Phrases, 1813.
6. Hopkins's Vocabulary, Persian, Arabic, and English, 1810.
7. Judson's Dictionary of the Berman Language, with explanations in English, 1826.
8. Piddington's Horn-Book of Storms for the Indian and China Seas, 1844.
9. Do. do. do. 1860.
10. Birt's Hand-Book of the Law of Storms, 1856.
11. Practical Rules for ascertaining and applying the Deviation of the Compass caused by the Iron in a Ship, 1856.
12. Biddlecombe's Naval Tactics and Trials of Sailing, illustrated by Diagrams, 1850.
13. Turkish Grammar compiled for the use of Travellers, 1834.
14. Arabic Grammar compiled for the use of Travellers, 1834.
15. Richardson's Grammar of the Arabic Language, 1811.
16. Sir William Jones's Grammar of the Persian Language, 1828.
17. Hough's Burman Grammar and Vocabulary, 1826.
18. Norie's Sailing Directions for the Coasts of Spain and Portugal, from Cape Ortegal to Gibraltar, revised by J. S. Hobbs, 1858.
19. Selby's Directions for approaching Bombay.
20. Griffith's Observations on some points of Seamanship, with Practical Hints on Naval Œconomy, 1828.
21. Orchard's Improved Method of raising Sunken Ships as adopted in the instance of the Barque "Roslin Castle," September 24th, 1856.
22. Fitzgerald's Memorandum of the Operations for removing the Wreck of the "Equitable" in the Fultah Reach of the Hugli, 1840.
23. Taylor's Memoir to accompany the Chart of the Arabian Sea.
24. General Description and Sailing Directions for the Coast of Káṭhiawád, 1855.
25. The Seaman's Guide round Java, &c., by Baron Melvill of Carnbee, 1862.
26. Horsburgh's India Directory, or Directions for sailing to and from the East Indies and China., &c., 1852.
27. The Australian Directory, Vol. I., by J. Burdwood, 1855.
28. The West Coast of Hindustán Pilot, including the Gulf of Manar, the Maldivh, and Lakadivh Islands, by Captain A. D. Taylor, 1866.
29. The China Pilot, by J. W. King, 1861.
30. Johnson's Deviation of the Compass, 2nd ed., 1847 to 1852.
31. Reid's Law of Storms, 2 Parts, 1849, 1850.
32. Jean's Rules for finding the Names and Positions of all the Stars of the First and Second Magnitude, 1844.

33. Loggan's Latitude and Course Corrector, with many useful Improvements in Navigation, 1851.
34. The Mercantile Navy List, and annual appendage to the Commercial Code of Signals for all Nations, by J. H. Brown, 1857.
35. Gordon's Lunar and Time Tables adapted to new, short, and accurate methods for finding the Longitude by Chronometers and Lunar Distances, 1849.
36. Owen's Tables of Latitudes and Longitudes by Chronometers of Places in the Atlantic and Indian Oceans, &c., 1827.
37. Galbraith's Mathematical and Astronomical Tables, &c., 1834.
38. Hutton's Logarithm Tables, 1858.
39. Weston's Tables for finding the Longitude by Chronometer at Sunrise and Sunset, 1849.
40. Tide Tables for the British and Irish Ports, 1863.
41. The Marine Steam Engine, designed chiefly for the use of Naval Officers and Engineers, 1849.
42. Instructions by Major General Sir John Malcolm to Officers acting under his orders in Central India in 1821-1824.
43. Penal Articles for the government of the several Officers of the Marine, 1824.
44. An Attempt to elucidate the Principles of Malayan Orthography, by W. Robinson, 1823.
45. Shakespear's Hindustáni Selections, 2 Parts, 1825.
46. Forest Reports of the Bombay Presidency for the years 1849-50—1855-56.
47. Extracts from the Holy Writ and various Authors, intended as Helps to Meditation and Prayer, principally for the Army and Navy, by Captain Sir N. J. Willoughby.
48. Roebuck's Collection of Proverbial Phrases in the Persian and Hindustáni Languages, 1824.
49. Report on Public Instruction in the Bombay Presidency for 1859-60.
50. Reports received from H. M.'s Secretaries of Embassy and Legation respecting Coal, to which is added an Appendix as to Coal in the British Colonies and India, 1868.

SELECTIONS FROM THE RECORDS OF THE GOVERNMENT OF INDIA, FOREIGN DEPARTMENT.

51. Report on the Pegu Teak Forests (No. 31), 1861.
52. Report on the Altaran Forests (No. 32), 1861.
53. Progress Report of the Forests of the Tenaserim and Martaban Provinces for 1858-59, 1859-60 (No. 29), 1861.

SELECTIONS, GOVERNMENT OF BENGAL.

54. Report on the Teak Forests of the Tenaserim Provinces, by H. Falconer (No. 9), 1852.
55. Notes on the Manufacture of Salt in the Tamluk Agency, &c. (No. 13), 1853.
56. Papers relative to the Katak Rivers, 2 Parts (No. 35), 1860.

PUBLICATIONS BY THE HAKLUYT SOCIETY.

57. Cathay and the Way thither; being a Collection of Medieval Notices of China, &c., translated and edited by Col. H. Yule; 2 vols., 1866.
58. Galvano's Discovery of the World, edited by Vice-Admiral Bethune, 1862.
59. The Three Voyages of Martin Frobisher in search of a Passage to Cathaia and India by the North-West, A. D. 1576-8, by Rear-Admiral Richard Collinson, 1867.
60. The Fifth Letter of Hernan Cortes to the Emperor Charles V., containing an Account of his Expedition to Honduras, translated by Don Pascual de Gayangos, 1868.
61. Narrative of Pascual de Andagoya, translated by C. R. Markham, 1865.
62. First Part of the Royal Commentaries of the Yncas, by Ynca Garcilasso de la Vega, translated by C. R. Markham; Vol. I., 1869.
63. The Life and Acts of Don Alonzo Enriquez de Guzman, A. D. 1518 to 1543, translated by C. R. Markham, 1862.
64. The Travels of Ludovico di Varthema in Egypt, Syria, Arabia, Persia, India, and Ethiopia, A. D. 1503 to 1508, translated by J. W. Jones, and edited by G. P. Badger, 1863.
65. The Travels of Pedro de Cieza de Leon, A. D. 1532-50, translated by C. R. Markham, 1864.
66. A Description of the Coasts of East Africa and Malabar, by Duarte Barbosa, translated by the Honourable H. E. J. Stanley, 1866.
67. The Three Voyages of Vasco de Gama, and his Viceroyalty, translated by the Honourable H. E. J. Stanley, 1869.
68. The Wonders of the East, by Friar Jordanus, translated by Colonel H. Yule, 1863.
69. India in the Fifteenth Century, edited by R. H. Major, 1857.
70. The Philippine Islands, Moluccas, Siam, Cambodia, Japan, and China at the close of the Sixteenth Century, by Antonio de Morga, translated by the Honourable H. E. J. Stanley, 1868.

FROM THE BOMBAY GOVERNMENT, THROUGH DIFFERENT DEPARTMENTS.

71. General Report on the Administration of the Bombay Presidency for 1869-70.
72. Annual Statement of the Trade and Navigation of the Province Sindh for 1869-70.
73. Reports of Cases decided in the High Court of Bombay, Vol. V ... Part II.
74. Tide Tables for the Ports of Bombay and Karáchi, 1871.

FROM THE GOVERNMENT OF INDIA, THROUGH VARIOUS DEPARTMENTS.

75. General Report on the Operations of the Great Trigonometrical Survey of India for 1869-70, by Colonel Walker, Superintendent.
76. General Report on the Topographical Survey of India for the season of 1869-70, by Colonel Thuillier, Surveyor General of India.

77. Report on the Trans-Himálayan Explorations in connection with the Great Trigonometrical Survey of India during 1869, by Major Montgomerie.

Selections:—

78. Papers on the Coal of the Narmadá Valley, Tenaserim Provinces, 1856.
79. Report upon the present Condition and future Prospects of Tea Cultivation in the North-West Provinces and in the Panjáb, 1857.
80. Selections from Reports of the Trigonometrical, Topographical, and Revenue Surveys for 1867-68, 1868-69, and 1869.
81. Report on the Altaran Forests for 1860.
82. Report on the Settlement of the Siam and Tenaserim Boundary, by Lieut. Bagge, 1866.
83. Annual Report of the Munipore Political Agency for 1868-69, by Dr. Brown.
84. Journal of the Salween Surveying Expedition during the season of 1864-65.
85. Journal and Report of the Karennee Mission, 1865.
86. Political History of the State of Jaipur, 1868.
87. Official Narrative of the Expedition to explore the Trade Routes to China *viá* Bhambo, under the guidance of Major Sladen, 1870.
88. Progress Report of the Forests of the Tenaserim and Martaban Provinces for 1858-59, 1859-60.
89. Report on the Bastar and Kharondo Dependencies of the Raipur District, 1861.
90. Survey of the River Gogra; Road over the Tounghoop Pass; Report on the Cotton Fields of Pegu, 1854.
91. Reports on the Geography of the Province of Pegu, and on the working of the Topographical Suvey, &c., 1856.
92. Papers regarding the Jabhalpur School of Industry, Flax Operations in the Panjáb, &c., 1856.
93. Report on the Gáikavád's Hospital; Notices on Kareen Nei, &c., 1858.
94. Reports on the Teak Forests of Pegu for the years 1856, 1857-58, and 1858-59.
95. Report on the Settlement of the Peshawar District, 1865.
96. A Narrative of the Russian Military Expedition to Khiva under General Perofski in 1839.
97. Memoirs of the Geological Survey of India. *Palæontologia Indica.* Vol. III., Nos. 1 to 8.
98. Memoirs of the Geological Survey of India, Vol. VII., Parts 1 and 3.
99. Records of the Geological Survey of India, Vol. III., Parts 1, 2, and 4.

FROM THE MADRAS GOVERNMENT.

Selections:—

100. Papers relating to the Survey and Settlement of the Western Delta Taluks of the Godávari District, 1870.
101. Notes on and Extracts from the Government Records in Fort St. George Public Department; Letters from England from 1670 to 1677.

FROM THE GOVERNMENT OF THE NORTH-WEST PROVINCES.

102. Selections from the Records of Government, Vol. IV., Part 2.

THROUGH THE AMERICAN GEOGRAPHICAL AND STATISTICAL SOCIETY.

103. Journal of the American Geographical and Statistical Society, Vol. II., Part 2.
104. Annual Report of the Adjutant General of the State of New York, Vol. I.
105. First and Second Reports of the Special Committee appointed by the Executive Board of N. Y. State Agricultural Society on the Statistics, Pathology, and Treatment of the Epizoötic Disease known as the Rinderpest.
106. Manual for the use of the Legislature of the State of New York, 1870.
107. Annual Reports of the Trustees of the Cooper Union for the Advancement of Science and Art for 1864, 1866, and 1869.
108. The Twenty-fifth Annual Report of the New York Association for Improving the Condition of the Poor, for the year 1868.
109. State Rights; a Photograph from the Ruins of Ancient Greece, &c.
110. Legislative Honours to the memory of President Lincoln, 1865.
111. Rules and Regulations of the Greenwood Cemetery, &c., 1870.
112. Annual Report of the General Agent for the Relief of Sick and Wounded Soldiers of the State of New York, 1865.
113. Charter of the City of Albany as amended by the Legislature of 1870.
114. Annual Message of the Governor of the State of New York, 1870.
115. Railroads to the Pacific Northern Route; its general character, relative merits, &c., by E. F. Johnson, C.E., 1854.
116. Introductory Report of the Commissioner of Patents for 1863.
117. Compound Comminuted Gunshot Fractures of the Thigh, and Means for their Transportations, &c., by Dr. J. Swinburne.
118. Report of the Chamber of Commerce for 1869-70. Presented by the Chamber.
119. Guide to Mineral Springs of Italy, by G. Jervis. By the Author.
120. Archives of the Ethnological Society of Florence, Vol. I., Part I. By the Society.
121. Annual Report of the Convict Settlement of Port Blair for the year 1869-70. By the Government of India.
122. First Annual Report upon the Geology and Mineralogy of the State of New Hampshire, by C. H. Hitchcock. By the Author.
123. Reports of the Geographical Society of Italy for October and November 1870. By the Society.
124. The Indian Economist, the Statistical Reporter, and the Agricultural Gazette of India, for February, March, April, and June 1871. By the Government of India.
125. Gazetteer for the Haidarábád Assigned Districts, commonly called Berar, 1870. By the Resident at Haidarábád.
126. Proceedings of the Royal Geographical Society of London, Vol. XIV., Nos. 3, 4, 5; Vol. XV., No. 1. By the Society.

127. Journal of the Royal Asiatic Society of Great Britain and Ireland, New Series. Vol. V., Part I. By the Society.
128. Journal of the Asiatic Society of Paris, No. 58, for May and June 1870. By the Society.
129. Notes on Kaira, a District in Fertile Gujarat, by Javherilál Umiáshankar Yajnik. By the Author.
130. Report on the Schools of the Sir Jamsetjee Jejeebhoy Pársi Benevolent Institution for 1869-70. By the Trustees.
131. "Nature," a Weekly Illustrated Journal of Science; Nos. 48 to 60. By J. N. Lockyer, Esq.
132. Nautical Magazine and Naval Chronicle, Nos. for November and December 1870, and January to June 1871. By purchase.

FROM THE SURVEYOR GENERAL OF INDIA.—MAPS.

1. Abbotábád Cantonments and Environs, 1868-69.
2. Agrá Cantonments, City and Environs, 1868-69; 6 sheets.
3. Agrá, country round.
4. Akyab Cantonments, Town and Suburbs, 1853-54.
5. Alláhábád Cantonments, City and Environs, 1867-68; 6 sheets.
6. Alwar, Plan of the Fort and City of, 1868-69.
7. Amballa Cantonments, City and Environs, 1867-68; 6 sheets.
8. Amballa, Dehli, and Hissar Divisions, 1868.
9. Amritsar Cantonments and Environs, 1868-69; 2 sheets.
10. Amritsar Division, Skeleton Map of.
11. Atlas Sheets.
12. Attok Fort and Environs, 1868-69.
13. Audh, compiled from the latest Survey.
14. Banu and Derá Ishmael Khán Districts, with the Kabul Kheyl and Mahsud Wazeri Hills. Upper Derahjat. 1856-61.
15. Bharatpur City, Fort, and Environs, 1857-58.
16. Bundi, in Rajputana, Plan of the City and Environs of, 1869-70.
17. Calcutta, the City and Environs of, including the Government Estate of Panchannogram, &c., 1852 to 1866.
18. Central India Agency, Sketch Map of the, 1868.
19. China Coast and Rough Sketch of the Provinces lying between Canton and Pekin.
20. Constantinople and India, Sketch Map showing the Routes between, 1867.
21. Damoh District, 1863 to 1866.
22. Delhi Cantonments, City and Environs, 1867-68.
23. Deoli, in Rajputana, Cantonments of, 1868.
24. Derá Ghází Khán District. Lower Derahjat. 1856-59.
25. Dinápur Cantonment and Environs, 1863-64.
26. Ferozpur Cantonment and Environs, 1868-69.
27. Ganges and Rávi, the Sub-Himálayan between the Rivers.
28. Hazara District.

29. Himálaya Mountains and adjacent Plains, Topographical Survey of part of the.
30. Hushangábád District, 1862 to 1867.
31. India, Sketch Map of, illustrating the Lines of Telegraph, 1870.
32. India, Countries on the North-West Frontier of.
33. India (Northern), Sheets Nos. 3, 4, and 7.
34. Jaipur, in Rájputana, Plan of the City and Environs of. 1865.
35. Jalandhar Cantonment and Environs, 1868-69.
36. Jalandhar, Hoshyárpur and Kangra: the, Trans-Sutluj Division, comprising the Districts of; 1847 to 1852.
37. Jhánsí City, 1858-59.
38. Jhelam and Ráwal Pindi Districts, with portions of Sháhpur, Leia, and Hazara.
39. Kánhpur Cantonment, Civil Station, City, and Environs, 1867-68.
40. Káshmir, Ladak, and Baltistán, or Little Tibet, Photozincographed Sections of part of the Survey of.
41. Kota, in Rájputana, Plan of the City and Environs of. 1869-70.
42. Láhur, Plan of the City and Environs of, showing the Civil Station of Anarkalli and the Cantonment of Mian Mir, 1868.
43. Láhur Division, comprising the Districts of Gurdaspur, Amritsar, Láhur, Sialkot, Gujranwala, 1850-55.
44. Lakhnau Cantonments.
45. Lakhnau City and Environs, 1862-66.
46. Multán Division, comprising the Districts of Gugaira, Jhang, Multán, and Muzzaffargharh, &c., 1853-58.
47. Nágpur District, 1858-60.
48. Nágpur City, 1865.
49. Naushera Cantonment, Town and Environs, 1866-67.
50. Narsinghpur District, 1862-63.
51. Panjáb and its Dependencies, with portions of the North-West Provinces and Afghanistan, 1870.
52. Panjáb, Sheets Nos. 1 to 8.
53. Peshawar Cantonment, City and Environs, 1866-67.
54. Poona, Plan of the City of.
55. Rewá, Plan of the City of.
56. Rohrí, Sakkar, and Fort Bakar, Plan of, surveyed in 1856.
57. Ságar District, 1854-64.
58. Sháhpur and Gujarát Districts, 1853-59.
59. Sialkot Cantonment and Environs, 1868-69.
60. Simlá, Plan of.
61. Sitabaldi, Fort and Civil Station of, surveyed in 1865-67.
62. Srínagar, or City of Káshmir and Environs.
63. Tea Localities in the Panjáb and North-West Provinces, 1862.
64. Tenaserim and the adjacent Provinces of the Kingdom of Siam, compiled by Lieut. Bagge. 1868.
65. Tonk, in Rájputana, City and Environs of, 1868-69.

The attention of the Society was also drawn to the last instalment of books received on account of the Premchand Raichand donation.

Among the several letters laid on the table, there was a long correspondence between this Society and the different Governments of India, and other literary institutions, on the subject of the varied accessions to the Library noticed above.

The Honourable the *President* called upon Mr. Sowerby to read his paper "On Tides and their Action—geologically and geographically considered"—announced for the evening.

The *President* then invited discussion on the various points raised by Mr. Sowerby.

Mr. Burgess said the paper was a most suggestive one and raised many points which would require careful consideration to put them in order so as to be made intelligible. Mr. Sowerby had held that there were twelve nodes of propagation for tides in each hemisphere, and that they were to some extent equidistantly situated. Something of this kind might perhaps be the case if the land were equally distributed and perfectly symmetrical, and also distributed in certain forms with relation to the sea. But these nodes could be accounted for by the tidal currents quite as well as that they were the origin of the tides, and if Mr. Sowerby would study the matter a little further he would probably find that that was the case. Airey points out that these nodes must take place under certain circumstances. Another point raised was altogether a new one—that of land tides—and the question asked by Mr. Sowerby was, Is the world a lunatic? Some years since, Sir William Thompson, of Glasgow, one of the ablest mathematicians and physicists of the day, started the question as to the degree of rigidity of the earth and how far it had effect upon tides; and by calculations from existing observations it was found that the earth was more rigid than glass. That a globe of glass of the same size as the earth would not present a more inelastic object to the attraction of gravitation than the earth itself had been shown by extensive and careful observations. The question now to be settled, and for which, if he mistook not, a grant was made by the British Association for its furtherance, was, how much more rigid than glass is the earth? That could only be investigated by observations much more delicate than any that had yet been made, and which must be

taken at points carefully selected, some near the Poles and some near the Equator. Then Mr. Sowerby's illustration of the ship on the tides as the "card and shilling trick" did not, he thought, exactly represent the case. If the tide in mid-ocean were a wave of translation, then the illustration would be correct, and the ship would simply be left by the tide moving at the rate of a thousand miles an hour, if it were not able to give it the necessary impulse, which it would do if, as Mr. Sowerby said, the ship were fastened to it. The tidal wave, however, was not one of translation, but of transmission, and that being the case the vessel receives but a very slight impulse, and he did not see how it would be possible for mariners to take advantage of that motion, considering its slight effect under the most favourable circumstances. It would take him some hours to put his ideas into a proper shape to set before an audience who had not previously studied the matter, and who were not aware of the principles upon which tides were calculated. Mr. Sowerby's paper, however, contained many points well worthy of consideration, and he trusted it would be found valuable when it appeared in its published form. He trusted Mr. Sowerby would take these points into consideration, and either make out his theory to be correct, if possible, or modify it in accordance with the results already arrived at.

Mr. Sowerby said that with regard to the action of the tides he had gone very carefully through Whewell, and the latest publication of Keith Johnston, and he could form no possible conclusion from them. Indeed, he had never seen a more imperfect explanation of the theory of tides. Whewell makes the tide commence near South Australia, and says that in two days it reaches the north of Europe. With regard to the tides he had said in his paper that in mid-ocean it was a tide of transmission, and that not until it approached the coast did it become a tide of translation, and that only in the latter case were ships carried along with it.

Mr. Burgess said he must have misunderstood Mr. Sowerby. It was the card and shilling explanation that struck him, and he held that that illustration was not applicable to the case, for the wave did not fly through and leave the ship, as the card flew from under the shilling, but gave it a rising motion, and when the wave of transmission had gone past, the ship would again sink to her former level. The

sending of the card from below the shilling was a matter of translation, and not of transmission; but if the card was forced a little so as to bend it upwards and raise the shilling, then it would be an illustration of transmission.

Mr. Sowerby said he believed he had pointed out in his paper that the ship would be sent slightly forward.

Mr. Burgess said the illustration was misleading, and was apt to make one imagine that the water slides through in a certain way, leaving the ship where it was, as the card slides through below the shilling. When the water was shallow the wave was gradually changed into one of translation, carrying the ship on with it. If the ocean were uniformly of great depth there would be no translation anywhere; and in a depth, say, of five thousand fathoms, where the rise is only eighteen inches, as the amount of water required to give the rise extended through the whole depth and was not on the surface, the amount of forward propulsion must be an almost infinitesimal quantity. In the Gulf of Cambay it became a wave of translation, and the ship would get the full force of it and be carried on to the rocks. The card and shilling would in that case go along together.

Captain Morland referred to Mr. Sowerby's remarks on Sion Creek, and said that the question as to whether Bombay harbour could be restored to its original depth on the western foreshore by re-opening the creek was one of vast importance and well worth taking into consideration; but as to the Elphinstone works he did not see how they could possibly tend to silt up the foreshore. The subsidence of the sea in the Gulf of Kachh had been a matter of inquiry for some time past, and papers on the subject had been read before the Society two years ago, but what it was owing to was as yet undetermined, and many careful observations would have to be made before the question was finally settled. Of course the action of the tide on the shore was to a great extent governed by the formation of the shore, and in the Gulf of Cambay it was found that in some parts the sea had encroached upon the land, and in others the land had encroached upon the sea. Whether the wave becomes one of translation in 50 fathoms was open to question. The change from transmission to translation was caused by the action of the water being impeded by friction on the bottom, which, as was well known, was the cause of surf all along the coast. He understood Mr. Sowerby to say that if the present breakwater at Karáchi is

continued, and if it be true that the tide flows from the south-west, the tide would have to pass round the breakwater to enter Karáchi harbour. That, he believed, was a mistake. The breakwater was formed off the south-western side of the harbour, and to the northward of the bar, and on the western side of the entrance: consequently the tide must flow straight up Karáchi harbour. With regard to the charts of Bombay harbour, it was an acknowledged fact that the Admiralty charts were quite insufficient for engineering purposes, and there were no contour charts with tidal lines. It was originally surveyed on a large scale—four inches to a mile—but the chart had been reduced by the Admiralty authorities to one inch to a mile, and was consequently, except for navigation, quite inefficient. It would have been a good thing if Mr. Sowerby, when alluding to the groin for the reclamation of the South-West Prongs, had given a little information as to the time it would take to accomplish the reclamation.

Mr. Sowerby replied that the process of reclamation would be very speedy indeed.

The *President* said there was one thing in which he thought they would all agree, and that was that their thanks were due to Mr. Sowerby for his very suggestive paper, and the interesting conversation to which it had led. It had in truth been a most suggestive paper; for as Mr. Sowerby read on, he (the President) went back nearly twenty years of his life to follow him in some parts of his description of Gujarat and Sindh. Nothing had struck him as more true than Mr. Sowerby's observation that they ought to be very careful in putting forward their theories, since it was generally the case that those who did so, often lived to find out on further investigation that their theories were entirely wrong. One of the pet theories of the last fifty years with regard to Sindh and the Panjáb had been what route Alexander took when he came from his conquests there to take shipping in the Indian Ocean. A few days ago he was reading General Cunningham's book on this subject, and he found that the Director General of the Antiquarian Survey of India had formed the same opinions from papers and surveys as he himself had formed from going all over the ground many years ago. After describing the many changes that had taken place in Sindh during his recollection, the President concluded by saying: "I am sure we are all very much obliged to Mr. Sowerby, and should be glad if he and other members will favour us with other papers. Since the old Indian Navy, with its scientific officers, has been removed

from us, the Society has not been favoured with so many papers; but I trust that now, when so many surveys are going on for irrigation purposes, harbour works, and other objects, for the superintendence of which very able officers have been selected, this Society will not in the future find itself in want of papers, but will rather suffer on the other side by having too many. I beg to propose a vote of thanks to Mr. Sowerby for the able and suggestive paper he has just read."

Captain Morland seconded the proposition, which was put to the meeting and carried unanimously.

The meeting terminated with a vote of thanks to the President.

SESSION 1871-72.

SECOND MEETING, *August 17th*, 1871.

THE ordinary Monthly Meeting of the Bombay Geographical Society was held in their Rooms, Town Hall, on Thursday, the 17th August, at 5 P.M.

Present—The Hon'ble Mr. Justice Gibbs, C.S., *President*, in the chair; Bháu Dáji, Esq., G.G.M.C., Hon. M. R. A. S., Vice-President; Máṇakji Kharsetji, Esq., F.R.G.S., F.R.S.N.A.; J. Burgess, Esq., F.R.G.S., M.R.A.S.; Professor F. J. Candy, M.A.; Barjorji Sorábji Ashburner, Esq.; J. Macfarlane, Esq.; Náráyaṇ Vásudeoji, Esq.; the Rev. J. S. S. Robertson, M.A., F.R.G.S., M.R.A.S., Members: and Captain Henry Morland, F.R.G.S., F.R.A.S., *Honorary Secretary*.

Visitors.—The Hon'ble Mr. Justice West, C.S.; Jehángirji Mánakji Kharsetji, Esq.; and S. A. Gliddon, Esq.

In reading the minutes of the last Meeting, Captain Morland observed that there was a little oversight with regard to Resolution No. 3 passed at the Meeting of the Committee held on the 30th of March last, authorising the appropriation of Rs. 800 from the Premchand Ráichand grant for the publication of a supplementary catalogue of the Library. He added that it was needless to recal the memory of the Society to the munificent donation of Mr. Bhagwándás Purshotamdas, who in 1865 placed at their disposal the sum of Rs. 3,500 for the publication of a general index to the first seventeen volumes of the Transactions, combined with a catalogue of the books, maps, &c. The sum of Rs. 2,406-11-6 had been disbursed in connection with the said publication, and the object of the donor having thus been carried out, the balance of Rs. 1,093-4-6 was, by a resolution of the Society, dated

the 26th September 1867, transferred to the general account of the Society. In justice, however, to Mr. Bhagwándás Purshotamdás it would, he thought, be advisable that the expenses required for printing the new catalogue be defrayed out of the balance appropriated from the grant, and that copies of the printed catalogue be labelled with the name of Mr. Bhagwándás.

The sense of the Meeting having been taken, the members present unanimously concurred in the propriety of Captain Morland's suggestion, and confirmed the minutes of the last Meeting with the exception of Resolution, No. 3, alluded to above.

Elections.—F. B. Girdlestone, Esq.; T. W. Wood, Esq.; and Kharsetji Mánakji Kharsetji, Esq., B.A., Oxford, who were duly proposed and seconded at the last Meeting, were, after ballot, declared members of the Society.

The following donations to the Library were announced, for which the best thanks of the Society were voted to the donors:—

DONATIONS.

1. Bulletin of the Geographical Society of Paris, Nos. for July to December 1870 and January and February 1871.—Presented by the Society.
2. Nautical Magazine, No. 7, for July 1871.—Subscribed for by the Society.
3. Bombay High Court Reports, Vol. VII., Part 3.—By Government.
4. Selections from the Records of Government, North-Western Provinces, Vol. IV., Nos. 3 and 4.—By the Government, N. W. Provinces.
5. General Report on the Revenue Survey Operations of the Bengal Presidency Upper and Lower Circles, for the season 1869-70.—By the Government of India.
6. Copy of the Edinburgh Evening Courant, 11th July 1871, containing announcement of the death of Dr. Keith Johnston.

Letters from the Secretaries to the Government of Bombay and the North-Western Provinces, forwarding donations for the Library, were also read.

The Hon'ble the *President* then remarked that, before the business of the Meeting was entered on, he would wish to impress on the members the urgent necessity of inviting the attention of Government to take into consideration the claims of this Society to better accommodation on the upper floor of the Town Hall than they enjoyed at present, on the removal of the Government Central Museum and the Agri-Horticultural Society to the Victoria and Albert Museum building, which was approaching completion. He expatiated at considerable length on the most undesirable situation of the Room

they at present occupied, with very defective means for light, ventilation, and the preservation of valuable manuscripts, books, maps, and charts, &c., which sustained injury in consequence of dampness, and moved the following resolution, which was seconded by J. Burgess, Esq., and unanimously carried:—

"That His Excellency the Patron be requested to take into consideration the claims of the Bombay Geographical Society to better accommodation in the Town Hall than it occupies at present, and that on the approaching move of the Museum and Agri-Horticultural Society's establishment to the Victoria Gardens and Museum, a room on the upper floor of the Town Hall, as before, be placed at the Society's disposal."

Captain Morland then read a report by Captain S. B. Miles, Bombay Staff Corps, and Acting 2nd Assistant Political Resident, Aden, describing that portion of the African Coast in the vicinity of Bunder Muryah, the chief port of the Mijjertheyn tribe of Somalis, contributed by Government.

Captain Morland after a few remarks observed that the best thanks of the Society had been already conveyed to His Excellency the Right Honourable the Governor in Council for this valuable and interesting communication. The Meeting then adjourned to next month.

SESSION 1871-72.

Special Meeting, *October 16th*, 1872.

A Special Meeting of the Bombay Geographical Society was held in their Rooms, Town Hall, on Wednesday, the 16th October, at 5 o'clock P.M.

Present—Commander G. T. Robinson, late I. N., *Vice-President*, in the chair; Ráo Sáheb Vishvanáth Náráyan Mandlik; Lieut. W. L. Searle, late I.N., F.R.A.S.; J. Burgess, Esq., F.R.G.S., M.R.A.S.; K. R. Kámá, Esq.; Barjorji Sorábjí Ashburner, Esq.; James Taylor, Esq.; Bhagvándás Purshotamdás, Esq.; J. Connon, Esq., M.A.; J. Macfarlane, Esq.; Dhirajrám Dalpatrám, Esq., G.G.M.C.; R. G. Walton, Esq., C.E., F.R.G.S., F.A.S.L.; the Rev. J. S. S. Robertson, M.A., F.R.G.S., M.R.A.S.; T. Ormiston, Esq., C.E., M.I.C.E.; and Lieut. Henry Morland, late I.N., F.R.G.S., F.R.A.S., *Honorary Secretary*.

The business before the Society was to consider a proposal received from the Bombay Branch of the Royal Asiatic Society, which was already approved of by the General Committee of this Society, for a junction of both the institutions, and to nominate a Sub-Committee to confer with that of the Asiatic Society for arranging the conditions on which it should be effected.

The *Honorary Secretary* having read the notice calling the General Meeting, the Rev. Mr. Robertson submitted that he was unaware of any definite proposition before the Meeting; that probably members of both Societies might object to amalgamation, as he himself did, and was averse to place the matter in the hands of a Sub-Committee before it was exactly known what was really the proposition, and how it affected both Societies.

The Chairman explained that as a proposition for the amalgamation had come before the Society, and some of the members desired it, the present General Meeting was called to enable members to give expression to their views on the subject, and, if desirable, to appoint a Sub-Committee to confer with the Sub-Committee of the Asiatic Society, and determine on what terms the amalgamation could be made; the result of this conference to be communicated to the Society at a General Meeting to be called as early as convenient, which General Meeting would determine whether or not amalgamation was to be effected.

Mr. Burgess in an eloquent speech dwelt on the advantages of amalgamation to the two Societies, and the cause of Natural Science generally.

The *Honorary Secretary* followed in the same sense, and dwelt with much force on the pecuniary benefit to both Societies, as well as showing that very many members of the Asiatic being members of this Society, the work of amalgamation was already begun.

Ráo Sáheb Vishvanáth N. Mandlik and Mr. Macfarlane followed with some very pointed remarks to the same effect, and which were warmly received by the Meeting; and after some general conversation, in which all the members present took part, the following propositions were carried unanimously:—

1. Resolved, that the Society entertains with favour the general proposal to amalgamate the Bombay Geographical Society with the Bombay Branch of the Asiatic Society.

2. Resolved, that to carry out the proposed arrangement, the following members be appointed a Sub-Committee to confer with that of the Asiatic Society, and thereafter to submit the conclusions arrived at to a General Meeting of this Society, for confirmation or otherwise, as early as convenient :—

Commander G. T. Robinson, late I.N.; T. Ormiston, Esq., C.E., M.I.C.E.; J. Macfarlane, Esq.; Lieut. W. L. Searle, late I. N., F.R.A.S; Ráo Sáheb Vishvanáth N. Mandlik; and Lieut. Henry Morland, late I.N., F.R.G.S., F.R.A.S.

The Meeting then terminated with a vote of thanks to the Chairman.

SESSION 1872-73.

SPECIAL MEETING, *January 10th*, 1873.

A SPECIAL MEETING of the Bombay Geographical Society was held in their Rooms, Town Hall, on Friday, the 10th January 1873, at 5 o'clock P.M.

Present—The Hon'ble Mr. Justice Gibbs, C.S., *President*, in the chair; Commander G.T. Robinson, late I.N., *Vice-President*; Captain G. F. Henry, *Vice-President*; Manakji Kharsetji, Esq., F.R.G.S., F.R.S.N.A; Atmaram Pandurang, Esq., G.G.M.C.; Varjivandás Mádhavdás, Esq.; Lieut. W. L. Searle, late I.N., F.R.A.S.; J. Macfarlane, Esq.; Dhirajrám Dalpatrám, Esq., G.G.M.C.; Professor F. J. Candy, Esq., M.A.; James Taylor, Esq.; Bhagwandás Purshotamdás, Esq.; Náráyan Vasudeoji, Esq.; T. Ormiston, Esq., C.E., M.I.C.E.; Kharsetji Manakji Kharsetji, Esq., B.A., Oxford.

Captain Robinson, *Vice-President*, in the absence of the *Honorary Secretary* on duty, read the minutes of the Special Meeting held in October last; also minutes of a meeting of the two Sub-Committees appointed by this Society and the Bombay Branch of the Royal Asiatic Society called last month, for deciding the terms and basis on which the amalgamation of both the Institutions could be effected.

The Hon'ble the *President* observed that the business before the

Society was to consider the following Memorandum of the terms which both the Committees had agreed upon :—

The Society's property consists of the following :—

2,260 Books and Atlases	Rs.	8,070	0 0
2,500 Maps and Charts on Rollers and in cases, &c.		2,500	0 0
4 Pictures.....		2,000	0 0
2 Globes		700	0 0
Book Cases, Furniture, Instruments, and Transactions ...		9,170	0 0
	Rs.	22,440	0 0

which we are prepared to combine with those of the Bombay Branch of the Royal Asiatic Society on the following terms, viz. :—

1. The two Societies to be amalgamated, the Geographical forming the Geographical section of the Asiatic, and analogous to the Physical section of the Asiatic Society of Bengal. The Geographical section to have its Secretary, who shall be Joint Secretary of the United Societies, with also a Sub-Committee of the General Managing Committee for the Geographical section.

FUNDS.

2. The Government Grant of ..... Rs. 50 0 0
The Premchand Raichand Fund, amounting to ... 2,659 11 3
The Bhagwandas Purshotamdas Fund, amounting to 498 15 4

be kept for the Geographical section, and applied to the purposes for which they were originally given.

3. The subscriptions of those who remain only members of the Geographical section be given over to the Asiatic Society.

4. Present members of this Society to continue members of the new section at the present rate of subscription, and to be eligible as members of the Asiatic on payment of half the Asiatic subscription, in addition to their Geographical subscription. All present members of the Asiatic Society to be Members of the Joint Societies gratis.

5. Life members of the Geographical Society to continue life members of that section of the Asiatic, but in the event of the Asiatic Society at any future time admitting life members, the donation already paid by life members of this Society should be considered.

6. In the event of a gentleman being a life member of the Geographical Society, and a subscribing member of the Bombay Branch of the Royal Asiatic Society, his subscription to the joint Society to be Rs. 90 per annum.

The Hon'ble the *President* having taken the sense of the Meeting with regard to the above terms, it was proposed by Captain Henry, and seconded by Mr. Náráyan Vasudeoji, and unanimously carried:—"That the terms of amalgamation proposed by the Sub-Committees be approved of by this Society, and the Asiatic Society be informed accordingly."

It was also decided that in submitting the memorandum of the terms to the Asiatic Society, this Society should suggest that suitable accommodation be provided on the main floor of the Town Hall for the Geographical section. They considered that the Rooms formerly occupied by the Government Central Museum would be well adapted for the purpose, and as the present Asiatic Society's Rooms were already cramped, additions to the joint Library on the subjects of Geography, Travels, Geology, Meteorology, Astronomy, Navigation, &c., might be added to the Geographical section. The Meeting then closed with a vote of thanks to the Hon'ble the Chairman.

ART. V.—*Tides and their Action, Geologically and Geographically considered, by* WILLIAM SOWERBY, Esq., C.E., F.G.S.—*Contributed by the Author.*

Read before the Society, July 27th, 1871.

Perhaps no two sciences have made such rapid progress during the last half-century as Geology and Physical Geography; being cognate subjects they have advanced with great strides, hand in hand as it were together. And they have doubtless been much assisted by the researches and discoveries in chemistry. Still, notwithstanding the great advances which have been made, it cannot but be admitted that the little we know tends only to show how very little comparatively we do know, and how much we have yet to learn. Scientific men of all nations have vied with each other in their endeavours to simplify and explain those vitally interesting questions; and their opinions, thoughts, speculations, and writings are contained in hundreds of ponderous volumes, which yearly increase in number, value, and excellence; and they are marked with such a beautiful degree of accuracy, and such a careful system of investigation, that the facts which are now on record have tended to convert much that was formerly mere speculation almost into an exact science. These questions have a charm about them which not only excites the imagination like sublime poetry, but they also exercise the reasoning faculties quite as much as the most abstruse mathematical problem. Indeed, the higher branches of mathematics have helped materially to elucidate many of the more abstruse branches of physical geography.

It is not then to be wondered at that so many great men, like Humboldt, Lyell, Murchison, Maury, and numberless others in all countries, have occupied the whole of their long and well-spent lives in furthering the objects of those noble sciences; and the results of their patience and perseverance have been the rapid advancement of scientific and economic geology, as well as physical geography: which results are now being daily applied to the ordinary business of everyday life, and in the development of the natural resources, of all civilized countries.

The more recent application of the discoveries in astronomy to geological science, and the composition of the sun, planets, and remote stars by means of spectrum analysis are also beginning to explain many things which were formerly enveloped in mystery or obscurity.

Many of those speculations, inquiries, and investigations as to astronomy, geology, the course of the tides and currents of the sea, the winds, the effects of mountain ranges, and similar subjects, are regarded by some people of a practical turn of mind merely to be interesting as purely scientific questions, suitable enough for the private study of those who have time, but comparatively of very little practical value. And there is no doubt that when any science is applied to the purposes of everyday life, it certainly does appear to a superficial observer to claim more immediate attention from practical men than it might otherwise deserve were the investigations inapplicable to the ordinary uses of the world and the common wants of mankind.

When arguing thus, however, it must never be forgotten that, but for the deeper and more profound researches of all scientific men, the smaller facts which are, as it were, the essence of those researches, and which are recognised by all as of the greatest practical utility, would fall very far short of what they are, because the ordinary portions of the knowledge acquired, and which are in daily use, form but a very small proportion of the great and minute inquiries and acquirements of scientific men, in order to obtain even a few practical results. Carlyle says "He who wants everything must know many things, do many things, to procure even a few."

The man of science may be likened to an artist or sculptor who spends a lifetime in producing one or two masterpieces of his art, which few are able to see or appreciate, while his statuettes or sketches please or satisfy the multitude who are his daily customers.

What can be more abstruse, for example, than the speculations and inquiries of a Maury? but here we have, as the consequence of his investigations, results of the greatest magnitude and importance to navigation, all which are too well known to need recapitulation here.

But geographers have yet much to learn on questions which Maury has so ably investigated, and the object of these preliminary and introductory remarks is to point out how science is connected with the business of everyday life. They may perhaps be considered superfluous in some measure by those who are well acquainted with geological and geographical science, but it will be seen further on how essential they are in a paper of this kind, which is partly theoretical and partly practical, or rather it is an attempt to apply theoretical investigations to a practical purpose, making them more particularly applicable to this

part of India, and especially to Bombay and its adjacent seas and countries.

All great geologists and geographers have been extremely careful in advancing new theories as to the formation of the earth, and the extreme caution of one of the greatest, namely, Sir Charles Lyell, has almost become proverbial, though there is no want of boldness in his speculations or care in his inquiries, but he having had to modify some of his earlier opinions, that which he now affirms is taken with greater confidence, being the results of a more mature judgment.

There are four very marked distinctions or divisions in the theories of modern geologists. These are:—First, the length of time that the various geological formations have been said to be going on, one accepting the Mosaic account of the rapid creation of all things in a few days, though there are few who do not reject this theory, or, rather historical statement, or try to modify it, as Hugh Miller did, calling the days of creation periods. The second are those who require countless ages for the earth's creation. And there is another class who alter this second theory by arguing that at certain stated and definable periods there were sudden and startling changes by which everything was upset, and everything made to wear a new aspect. Of this latter class of theorists is Mons. Alphonse Adhemar, who some years ago published his theory of Cyclical Deluges. The author of this has been unable to procure a copy of his book, but most of his arguments have been reproduced in a small volume by Mr. William Walker, F.R.S.V., a gentleman formerly well known in Bombay. A copy of this book is now in the Society's library. The theories of M. Adhemar, and some others added by Mr. Walker, will be referred to hereafter in the course of this paper.

The other two theories are the fluvial or aqueous and the igneous, each of which has its special pleaders and supporters, giving the greater preference to the one or the other according to their bent.

The object of this paper is not to recapitulate what has been said on behalf of any one of the theories that are current, but to examine one or two prominent points in the arguments advanced, and to see how far they coincide with recorded and well-known facts.

First, as regards the theories of the sudden or gradual formation of the earth.

It is very evident from even a most cursory examination that many great changes must have taken place on the face of the globe, but

whether they have been slow and gradual, or rapid and sudden, it is extremely difficult to determine, for the evidence leans both ways. We know perfectly well with what rapidity in the present day certain insects and even animals are propagated and die off, and it is just as possible as not that at some former period of the world's history large and gigantic animals like the Ichthyosaurus and the Mastodon may have been, in a similar way, "but the creatures of an hour," though we must do violence to our notions at the present age on such matters to reconcile such a theory with the present state of things. Neither can we argue against sudden physical and geographical, as well as geological, changes on the earth; for hardly a decade passes that there is not the outburst of an earthquake or volcano to record in some part of the world, or some disastrous though partial deluge which sweeps over a whole country, destroying the inhabitants and their works. Let any one consider for a moment what would be the result of denudation if all the rivers in the world were absolutely or even comparatively straight, instead of, as they are at present, almost all invariably gently winding and circuitous streams. Their length would then be quite one-fourth of what they now measure, and in many cases even less; then the gradients of their beds would be proportionately increased, and the force of their currents would not be simply multiplied or quadrupled, but they would be increased more nearly as the squares of their gradients, if not a much higher power. So that streams which now bring down earth, sand, gravel, and stones would then transport stones, boulders, and huge detached masses of rock.

Something like what might be expected to occur may be seen at the base of the Himálayas, the Alps, and other mountain ranges where huge masses of rock, many tons in weight, are found all about, which have been detached and transported from great distances in the interior.

Upon one occasion the author of this paper dug up the undecayed and unchanged trunk of a Khyr tree of the existing species which had apparently been but very recently buried beneath a bed of limestones, boulders, and coarse detritus thirty feet below the surface. This was at the foot of the Himálaya mountains.

Again, let any one examine a tidal or even non-tidal river, and note the frequent rapid changes in its bed and course; the trunk of a tree stuck accidentally in the stream will sometimes cause the direction of the river to be entirely changed by producing either a silting up or

scour, according to circumstances. And also the throwing out of artificial works has at times a like rapid effect, of which many examples can be given. As, for example, the running out of a solid approach to the jetty at the Surat Castle has made dry land where formerly, a very few years since, there was a depth of sixteen feet of water at low tide. The throwing out of groynes opposite Madras along the shore has caused the sea frontage to silt up rapidly to a very considerable width, and thus saved the sea-walls of the fort from being undermined, and added a considerable strip of land to the shore. The closing up of Sion Causeway has resulted in the silting up of the northern portion of the harbour of Bombay, it is said, to a distance of half a mile, and the projecting walls of the Elphinstone Bunders has probably helped the operation. The construction of groynes in Hendon Bay, on the east coast of England, near Sunderland, entirely altered the action of the tide in a few months, so much so as to cause a rapid silting up on the beach, where formerly there was a constant undermining and breaking away of the high bank which faced the sea.

All these are arguments from familiar and well-known places in favour of the rapid changes that have occurred by very ordinary means through the action of the tides on the earth's surface. But many arguments can also be brought forward in favour of the gradual and slow theory of change. Take, for example, the deposits of sand and detritus along coast lines, such as on the western coast of India, reference to which was made in a paper presented by the author of this paper to the Bombay Geographical Society in February 1870 relative to the Narmadá river. In that paper it was pointed out that, owing to the action and counteraction of the sea, its retreat and the accretion of land was exceedingly slow and gradual, notwithstanding the large quantity of detritus brought down by the Narmadá and other rivers. Indeed, there is good reason for believing that such-like changes are apt to oscillate like a pendulum, that is, accretion goes on at one time, and denudation and encroachment at another; but more of this hereafter.

From what we see in the present age of the action of the elements and tides, the theory of slow and gradual change is more completely illustrated than the sudden and abrupt, though, from what has been said above about changes which are going forward under our eyes, it would not appear to be at all necessary that countless ages should have passed away in order to account for the world's formation.

Let us now refer to the Adhemar-Walker theory on this question, which argues that at certain stated and definite periods in the history of the universe, the world during the precession of the equinoxes has tilted over, and the water from the polar regions, which was at one side of the equator, has flowed over to the other side, and its suddenness has caused in this manner a succession of cyclical deluges and all the changes on the surface of the globe.

The theory is based upon the precession of the equinoxes and upon the idea that one of the poles gets for the time being a greater amount of the sun's rays than the other, and that as this goes on for a long period of time, one pole gets more frozen and heavier in specific gravity than the other, and that therefore it tilts up suddenly, and the waters rush off to the other side of the globe. It in fact resembles the see-saw motion of the boys at each end of a plank balanced midway on a log of wood : the only thing additional required to make the illustration complete would be a lot of apples or marbles rolling to one end or the other each time ; or like two buckets of water fixed at the end of a large trough, and as one bucket got frozen, or the other, and the equilibrium got disturbed, the water would rush across the trough. The theory breaks down in the very outset, for it must be recollected that the precession of the equinoxes is slow and gradual, and not sudden, and that there is no such thing in the universe as up and down, these being only relative terms. The theory is also somewhat an extension of the gulf-stream theory, or of the cold and warm water of the poles and the equator exchanging their relative positions on the globe. But Maury's investigations have proved that this is constantly going on, and a continuation of these investigations is throwing further light upon the subject. Besides, there is reason to believe that at the south pole there is a large continent, and not water.

But if we were to accept the Adhemar-Walker theory, and to allow a definitive period for each time the earth tilted over, say 10,000 years, and if we allot a separate geological formation for each time the earth has performed the operation of capsizing in the way described by M. Adhemar, we have only to multiply the 10,000 years by the number of distinct formations, and we then obtain an approximate estimate of the number of years it has taken to create the world, and this would give us for the formation of the European rocks and strata about two millions of years.

But there is another difficulty in this theory which meets us. It is this: assuming such a tilting to be not impossible, would the water which surrounds the polar regions, and which is of limited area though of considerable depth, be sufficient to overspread the whole earth with a deluge? We may assume that every particle of water neither could, nor would, leave the polar regions all at once, and thus create a vacuum; because it would need to be filled up from some other region, which is unlikely to happen, and does not accord with the theory. The area of the whole earth is 197 millions of square miles, and the polar regions only three millions of square miles, and if the water of the Arctic regions were spread over the globe they would not increase the height of the waters of the intervening space beyond an ordinary billow of the sea.

There is another well-known fact, that no movement of the ocean caused by earthquakes, cyclones, or hurricanes has ever spread across the equator to the opposite side of the globe, though they have been known to travel thousands of miles within the zone in which they were originally generated, and it is hardly likely therefore that the sea would be transported *en masse*.

There are a great many other very doubtful points in M. Adhemar's theory, which require clearing up yet before it can be accepted, and it has been referred to in this paper because the attempt to connect astronomy with geology is now attracting considerable attention amongst scientific men, and it has therefore been considered that a few words in reference to this subject would not be misplaced in discussing the question of tides and their effects, for if the theory were admissible, then the effects would be very great.

Having disposed of this part of the question for the present, let us now take a brief glance at Mr. Walker's new deductions and conclusions regarding coal formations. The author is induced to refer to this part of the subject in the present paper because, as it will be seen hereafter, it is not entirely unconnected with tides and their action, for Mr. Walker distinctly traces the connection of coal formations with cyclical tides or deluges. The question of coal formation is also a very important one in India, and every theory advanced deserves therefore the most careful investigation by those who are interested in the resources of this country.

Our knowledge of the mineral resources of India, notwithstanding that there is a Geological Survey Department, is still extremely limited.

Indeed, and in fact, our knowledge of the mineral resources of some parts of the world is little better, comparatively speaking, than if it were the planet Mars or the more distant Jupiter. This may appear to some rather a sweeping assertion. But the author of this paper can speak with some confidence on this point, having had opportunities not only of noticing the mineral prospects of this country from the plains and hills of Madrás to the outlying snowy peaks of the Himálayas, but also in South-Eastern Africa, where the diamonds are now being discovered in abundance, but where there is plenty of that much more valuable form of the diamond, namely, good workable coal, particularly in Natal and to the north of it. And the author also remembers the time when there was not a single ounce of iron made in Cleveland, where now thousands of tons are made annually, much of which is exported to India.

Mr. Walker adheres to the general belief that coal was entirely of vegetable origin; that it is in fact the remains of trees grown and then buried in the earth, and finally mineralised either by the action of heat or by some other chemical or mechanical process; but he rejects the opinion that the trees of which the coal beds are said to be composed have grown and fallen, been deposited and changed in the exact position in which they grew: for he argues, and very justly, that the action of the atmosphere and the sun would very speedily reduce them to what is familiarly known as *touchwood*. He also points out a well-known fact to coal-miners, that though many fossil plants and trunks of trees are found in the coal formations, still they are invariably like the roots, and seldom complete trees; and he might have added further that such specimens of fossil plants and trees are but a very trifling percentage of the great bulk of all coal beds except perhaps the brown coals or lignites of Austria and other places. So few are they in reality, and so small a proportion do they form of any true coal bed, that it would be just as reasonable to say that a sandstone or chalk formation was made entirely of the remains of trees or animals because there happened to be a few fossil specimens of the plants and animals which lived on the earth in those days found embedded in the rocks.

There is no doubt, however, that marine animals have had a great deal to do with the formation of some limestones, such as oolites, &c.

Mr. Walker also rejects the theory that the coal formations are the result of gradual washing down of forests into deltas of rivers, that have there undergone transformation into coal. His theory is that at

each cyclical deluge the forests on the face of the earth were swept away, and, gradually drifting together, formed a huge mass upon the ocean, and were there deposited in some hollow, and finally converted into coal. It is not necessary here to stop and calculate what would be the exact quantity of forest that would be required to make any one single known coal formation if the whole was denuded from off the earth's face at the time, and it would be difficult, according to his theory, to account for the coal formations within the tropical regions: indeed he recognises this difficulty himself, and argues that there is very little; but we know that there is some, and who can tell how much more there may be—who knows what treasures of this kind "*the dark unfathomed caves of ocean yet may bear.*"

Still more difficult would it be to account for those carboniferous and carbonaceous shales which are coal and yet not coal.

There is one argument in favour of the theory. It is this:—He assumes that the forests would collect in a mass as driftwood, and coming to some still part of the sea it would rest there, and finally subside. Now, if the various mountain ranges on the globe acted as huge groynes when the world was overflooded, they would produce by their action certain calms in mid-ocean, and it may and has been argued out most curiously that the neighbourhood of Mount Ararat would be still water if the present mountain ranges in that part of the world existed at the Deluge. This is mentioned as a curious piece of deduction, and no more.

The subject of coal formations has been dwelt upon rather longer, perhaps, than the theory deserved, but it leads up to the more important question of the possible limit of coal formations.

Having spent several years of his early professional life amongst and in connection with coal and other mines in Durham and Yorkshire, the author of this paper has some practical acquaintance with the subject of coal deposits, and it has never appeared very clear to his mind why it should be accepted as a decided theory that coal is of vegetable origin, though the remains of trees and plants have been found in coal beds, for the coal itself is mineral in appearance, and in fact, besides, there are many beds of coaly shales, also iron beds, or shales full of carbon and iron (black band as it is called), all which tend to prove the mineral rather than the vegetable origin of coal. Besides, some coals are poor in carbon, some rich; some are poor in bitumen, others rich; some are in combination with other minerals, and some

approximately pure coal or carbon. The truth is that the coal formations resemble ironstone, sandstone, limestone, clay shales, and every other mineral substance which we find in beds, and it readily combines with most of them. The natural inference therefore is that it is of similar origin to other minerals, and that coal beds have been formed just as iron, limestone, and sandstone beds have been formed, but by what special agency it is of course difficult to determine, though time and close investigation will continue to throw much light upon this abstruse and recondite question.

One idea suggests itself amongst many others of less weight—it is this, that as the known coal beds are for the most part in colder latitudes, may not the carbon-producing agency, whatever it was, have been applied to produce coal instead of vegetation?

The origin of the idea of coal being made from trees no doubt was that as vegetable productions, especially the denser kind, such as timber trees, contain a large proportion of carbon, *ergo* then coal must be of vegetable origin; but it takes five to six tons of dense timber to make one ton of charcoal, and if the relative specific gravity of charcoal and mineral coal be taken into account it would of course take a very large quantity of the former to make a ton of the latter; and besides this the vegetation of former periods appears to have been by all accounts very much like the soft, spongy vegetation in the swamps and marshy grounds of the present day, and not hard, compact timber, like teak, oak, birch, beech, &c., such as are now considered suitable for making charcoal.

The late George Stephenson used to say that "coal was bottled-up sunshine." This idea was very characteristic of the man but not very explanatory of the subject, though there is no doubt that the sun, air, and light have had, and still have at the present day, much to do with the concentration of carbon in the shape of trees, &c., which contain about 25 per cent. of it, though the soil upon which they grow does not contain a single trace thereof. There are, however, in the world at the present time many regions where what may be termed incipient coal formations exist in the shape of hydro-carbon lakes of solid bitumen. At Auvergne there are bituminous springs, and on the Caspian Sea is found inflammable gas and naphtha, and petroleum springs also exist in Western Asia, in Palestine, and in Burmah, while the well known rock-oil of America yields 100 millions of gallons yearly; and it would not be very difficult to understand how these

carbonic productions might in a former state of the globe and under favourable conditions become solid mineral coal. Formerly it was the custom of geologists to say that coal formations belonged to the "Coal period," and limit them to a particular group of rocks called the "Carboniferous." More recent researches have demonstrated that good coal may and does exist in other than what was then called the true coal series of rocks. These remarks are made not so much to introduce any new theory, but rather as a caution to those who investigate geological formations of whatever kind not to jump too rapidly at conclusions, though to the experienced practical miner such precautionary remarks will doubtless appear very superfluous; the spirit in which such inquiries should be conducted is not to find out the actual existence of coal in any particular locality—for that may end in disappointment—but to ascertain what really does exist; for the author perfectly well recollects that at the time when the Cleveland iron beds were being actually worked, smelted, and sold as pig iron, the same ores were pronounced as quite worthless for smelting purposes by scientific men, and any attempt at generalisation, or pretence to be able always to pronounce dogmatically what may or may not be found below by a mere inspection of the superficial strata, is very much akin to the mystical method of pretending to find water or mineral veins by the willow wand and the divining rod of old-fashioned miners. When the well-known Pemberton pit, near Sunderland, was being sunk, the proprietor had nearly exhausted his means, and was advised to desist. "No," he replied, "I'll sink to Hades, and if I don't find coal I'll find cinders;" and the final result of his efforts was the discovery of one of the finest coal beds in England, which stretches and is worked far away under the German Ocean, but he had well studied the overlying strata before he began, and knew perfectly well what he might expect. It was merely a question of depth and determination.

Dismissing this subject, we will now proceed to examine an equally, if not much more, important question, particularly as regards Bombay, namely, the tides and their action; and especially their effect and the application of a knowledge of tides to the western coast of India and its havens, not forgetting the two most prominent, namely, Bombay and Karáchi.

In a former paper presented to the Society in 1868 by me, the question of the action of the tides in the Gulfs of Kachh and Cambay were briefly discussed. It was then pointed out that there was a peculiar

oscillation of the tides in the Indian Ocean, which, so far as the author was aware, had never before been brought under notice or published, and a further communication on this subject was then promised. The author has had but very few opportunities since that time of making actual observations on the subject, but it has not been lost sight of in the interval. It is, however, only by extended observations and a careful study of the tide tables that further light can be thrown upon this most interesting matter.

In the paper referred to, it was pointed out that there were certain places in the Indian Ocean where there is little or no tidal rise, and these were called nodes, and certain other places where the tides are of an extraordinary and unusual height, and these were called heads, and that the distance between each of those places was about 1,800 miles, or 30 degrees of an arc of the earth's circumference. The following is a list of some of those places.

Commencing at New Zealand, there is—

Low Tide—rise S. T.	Feet.	High Tide—rise S. T.	Feet.
Hawke Bay	3	Nelson	14
Port Macquarrie	4	Broad Sand	20 to 30
South Coast, Australia	1 to 4	North Coast, Candar Harbour	37½
Bencoolen	3 to 5	Bay of Bengal	22
Maldives	3	Gulf of Kachh	16
Somauli Coast	4	Madagascar	17
Algoa Bay	4	Angra Pequena	8 to 10

The above have only been given as an example, but the list might be extended right round the globe, when the different nodes and heads would form when joined together a succession of equilateral triangles.

But the places given above must not be regarded as the exact positions of the nodes or heads of the tides, but only approximate places where the tidal rise is known.

It is perfectly well established that the moon, being the nearest celestial body to the earth of any magnitude, acts by its attractive influence in causing the tides to ebb and flow, and that the sun also has a similar influence but less, being more distant.

The means or medium by which this action is effected has not been yet defined or discovered, either by astronomers or natural philosophers, but it is called the attraction of gravitation. There is, however, little doubt but that some subtle unbroken and unknown medium connects the moon and the earth, through which they act upon each other; finer than the finest gossamer thread of the silkworm; more rare than the rarest atmosphere with which man is acquainted: through which

medium direct and actual communication takes place, not only between this planet and its satellite, but between all heavenly bodies. This is as certain as that there is a direct connection between the two ends of a telegraph wire, and this medium philosophers have long been bent upon discovering and explaining.

The ordinary action of the moon in producing tides is only partially understood, but need not be recapitulated here; but at what point or points on the globe the action of the tides begin, where they are least and where greatest, and why they are large or small at certain places, is still a most obscure and ill-explained question.

The Admiralty tide-tables give us the rise and fall of the tides in very many places on the globe, and when we know, for example, the height of the tide at some particular day and at some exact hour, we can easily determine by calculation the height and time of tide on any other day according to the moon's age, making due allowances for prevailing winds, headlands, sandbanks, and other local influences. But it has not yet been clearly, or even partially, explained why the height of the tide should be only one foot, or even less, at Cochin, and 12 to 18 feet at Bombay, gradually increasing all the way up the coast; though we can explain in some measure why it is 30 feet at Cambay, because it is at the head of a narrow diminishing channel with a bell-shaped entrance or estuary.

Wherever the sea and land meet we can obtain exact tidal observations; but in the open sea we have very few or no such records, at least so few as to be hardly worth naming.

We know very well that when the waters of the sea are driven into a narrow channel they naturally rise, but where there is a broad expanse of ocean there is less tendency to rise up to a great height.

We also know that the tide impinging upon any coast line should have a tendency to rise to a higher level merely from its impact upon the shore, but an examination of the tides does not entirely bear out this conclusion. The present theory, as laid down by Dr. Whewell and Keith-Johnston, is that the tides are propagated from the great Southern or Atlantic Ocean, and that they roll round the globe from the point where propagated.* This theory is, however, most unsatis-

* Professor Candy explained this theory very plainly by taking hold of the corner of a table-cloth and giving it a shake, but the earth is not flat like a table, but round like a globe, and there is no corner such as indicated by Professor Candy, where the moon can catch hold of the waters of the ocean and give them a shake such as the professor indicated.—W. S.

factory. And the result of an examination of the tides, as recorded in the tide tables, is that there appear to be several points or nodes at which the tides begin, or from which they are propagated, and that these points are about 30 degrees or 1,800 miles apart; and if we assume this to be the case, then it would seem that there are twelve such points in each hemisphere north and south of the equator, which would encompass the entire globe: and probably a more careful examination will show that there are even more points or nodes, probably a separate series in each zone, all acting in harmony, and doubtless dovetailing as it were into and acting upon each other.

The motion of the tides appears to be not unlike the heaving of the human breast when breathing heavily during deep sleep, or in the partial opening and closing of an umbrella, the expanding force being, however, external, and not internal, and the action of the moon and sun are not unlike the rapid passage of carriage-wheels across pools of water, only instead of dashing the water aside they draw it up, like drawing up portions of an inflated or flexible globe.

But not only are the waters of the ocean acted upon in causing an upheaval, vibration, oscillation (or by whatever other name it may be called), of the sea, but it is believed—and there is some probability for that belief—that the crust of the earth itself is also similarly acted upon, and that it breathes or heaves under the same influence, though in a lesser degree. This idea is worthy of the more careful consideration, because if it is the case, then it may tend to explain the gradual rising or depression of certain coast lines, such as that of India, and particularly of the Gulf of Kachh and Cambay, which was referred to in a former paper presented to the Society in 1868. This idea of land tides as well as sea tides is possibly not a new one, though I am unaware of its ever having been mooted or published before, and there may really be nothing whatever in it, but perhaps it may be worthy of more than a passing thought.

The theory of earth tides as well as those of the sea may appear rather novel, owing to its solidity, but perhaps the well-known experiment with a thick iron ring may be remembered. It is this: if a thick wrought-iron ring of say 6 or 12 inches diameter, and of from 1 to 2 inches in thickness, be carefully turned in the inside to an exact gauge, and if a gauge rod be put across it which fits with perfect accuracy, it is well known that the most gentle pressure with the fingers on the two sides at right angles to the gauge will compress

the ring and elongate the other diameter, so that the gauge will at once drop out, though it seems quite impossible that so slight a pressure will affect the circular form of the ring.

We know that the moon has a most direct influence upon the minds of lunatics, as can be readily seen by examining the daily records of an asylum; and it may have as direct an influence on the solid earth, if we could only trace it.

In order to determine whether there is actually an uniform oscillation within 30 degrees or 1,800 miles all round the globe, and whether it is a definite and absolute law, or merely an accidental coincidence, it would be necessary to have many more tidal observations than we have at present; but as all marine and harbour works depend for their success on the absolute accuracy of such observations, as well as on an exact estimate and acquaintance with the tidal action of the adjacent seas, it is a subject quite worthy of any reasonable amount of trouble and pains to find out all about the matter.

In an early part of the paper it was stated that the tidal action along coast lines was probably of an oscillatory or intermittent character, and that at one time for a period, short or long, the action of denudation took place on one part of the coast, and silting up in other part. Now this is apparently just what has been going on between the Gulf of Kachh to the westward and the Bay of Cambay on the eastward, as referred to in a former paper. We know by unmistakable indications that the sea has at one time overspread the Runn of Kachh for great distances, and that it is now comparatively dry and elevated. And we also know that it has run further up the Gulf of Cambay than it does at present, and that the latter is now silting, or has silted up, while the former is again being gradually submerged. This latter has been attributed to slow subsidence by earthquake influences. In addition to this, we have partial or subsidiary oscillations of the same kind going on within the same localities, a sort of wheels within wheels; for there is silting up going on in the estuaries of the Tápí and Narmadá, while there is a compensatory encroachment taking place on the coast near Dana and Oolpar. These alternate changes appear to get gradually less and less as time goes on: they are like a pendulum set in motion, which oscillates slower and slower till it stops, unless the original moving force is repeated.

It has been stated that the action of the sea cannot be too minutely studied, and all its peculiarities most carefully noted, because it is of

the greatest practical utility and advantage in carrying out marine works. Seamen know very well how much they have gained and been benefited by the researches of Maury and others. They know, for example, how their voyages have been shortened by taking advantage of the prevailing winds and currents of the sea in making those voyages; but there appears to be a yet further step possible in ocean navigation, in taking advantage of the tides in making long voyages.

The mariner avails himself of the tides when nearing land and when passing up and down rivers, but in the open sea he only thinks of well-ascertained currents and trade winds, and in what way they can help him forward; but the tides he has never been able to make much use of, because they are so imperfectly understood and appreciated.

To enter upon a closer examination of the question: we know, for example, that the tidal wave travels up the western coast of India from Ceylon to Bombay, a distance of about 800 miles, in about ten hours, which is at the rate of 80 miles per hour, but vessels floating on the surface merely come along with the wind or by means of steam in three or four days, or even more.

Both Whewell and Keith-Johnston say that in some parts of the mid-ocean the tides travel at the rate of 1,000 miles per hour. But that is doubtful, as the opinion is based upon their own theory of propagation. These great tidal waves are called waves of transmission—that is to say, the waters of the sea are merely like so many sticks or telegraph wires acted upon at one end and the motion is rapidly transmitted to the other end—consequently anything floating on the surface is only sent along to a distance of a few feet, equal to the space that is necessary to raise the head at the other end 10, 20, or 30 feet, as the case may be. But a great body of water must also travel towards the head of the tidal wave as well, in order to fill up the spaces with tidal water.

The action of these waves is similar to that of the well-known experiment of a shilling placed over a card on the tip of the finger. A smart blow at the card sends it flying; but the shilling remains in the position on the finger's point. * In mid-ocean, of course, it is only the

* This illustration of the card and shilling has been objected to because it is the heavy body which remains behind, and the light body, the card, which flies off; this is exactly so, whereas in the sea it is the heavy body, the water, which passes on, and the lighter body, the vessel, which remains stationary: the illustration is there rather inapt, though not quite inapplicable.—W. S.

force that is so transmitted, but in shoaler water the sea water passes rapidly on as well. If by any means the shilling were attached to the card, then it would fly off also. So a ship is left in nearly the original position when the wave found or passed it; but if by any means the vessel could be made to attach itself to the wave they would then travel along together. How far this can be accomplished is a question for mariners to discuss.*

The principle of transmission holds good in the open sea; but so soon as the wave approaches shoal water near the land it becomes a wave of translation, and everything on the surface of the sea is carried along with it, as in the case of the vessel going up the Gulf of Cambay, for example: it would "drift," as it is called, along the top of the tide and be borne on to its certain destruction (as many a one has been), unless well managed and skilfully navigated. It is generally in shoal water where a seaman's troubles commence and where accidents occur, and not so frequently in the open sea, as the captain of the Great Eastern observed when he was in Bombay harbour.

But at what exact depth the tidal wave ceases to be one of transmission, and becomes a wave of translation, no one has yet ascertained, for there are many contingent circumstances which affect the problem. In all probability the change begins at soundings of 50 fathoms, for at that depth the bed of the ocean is distinctly acted upon by the prevailing tides or winds, or both, as shown by model charts, and as the depth decreases nearer the shore the action increases, until in shoal water of say 10 or even 15 fathoms it is a decided wave of translation.

Tidal waves passing round an island become divided, and after travelling round the shores meet again on the other side and pass on with increased velocity, the point of meeting being disturbed by eddies; and we can thus understand that if a pier or other marine work were thrown out, or ship anchored, under the shelter of any island near to where the tide reunites, it would be in a most uncomfortable position owing to the commotion in the water; this may be illustrated by the anchorage off Gogo under the shelter of Perim, or the proposed

* Great objection has been taken to this suggestion, but every one knows the action of a deep-sea anchor in retarding a ship's progress; this is of course a reverse argument. It is also well known that a heavy log of wood floating down a rapid stream passes on more rapidly than a light boat, because the wood is more deeply immersed and the current has greater power over it than over the boat: the author had recently an excellent opportunity of verifying this fact.—W. S.

pier in Bombay harbour under the shelter of the Oyster Rocks; everything therefore depends on a very minute examination of the tides before the precise position of such a work can be determined upon.

Submarine elevations, or, more properly speaking, sandbanks, have a like effect, and more than one instance could be given where vessels have felt the sudden influence of the tide after it has passed beyond those banks and joined on the other side.

The retarding influence of islands, sandbanks, and the subsequent junction of the tides and their accelerated force, is quite well understood by mariners, though not always appreciated or guarded against, and the consequence has been the wreck of many a good ship for want of this knowledge, or probably the skilful application of it, and in no part of the world has this been more frequent than on the coasts of India, and particularly that part just outside and to the south of Bombay harbour. The author feels, however, that he is on rather delicate ground among practical mariners, not being a seaman himself, and they will readily discover how much these observations are worth.

But we will now apply a few of the conclusions and deductions from what has been above advanced to works of an engineering character, which is more the author's own speciality. The action or effect of the sea on any coast line is very much like the action of a large mob, the waves being the mob, and the "ugly rush" against the Hyde Park palings some short time ago is an apt illustration of the effect of such a mob, and the means of resisting that mob is very similar to the means which should be employed to counteract the effects of the sea striking against a coast line. A number of guns at suitable distances apart with their muzzles pointing to the mob would soon have dispersed it. And if we substitute groynes for guns, and present their heads to seaward at right angles to the direction in which the tide sets, the force of the sea will be broken, and its action entirely reversed, for accretion of land will then take place. The analogy between the sea and the mob is very perfect, because both bodies are equally incoherent—the only difference is that the sea continues and the mob generally disperses.

The determining then of the exact direction in which the tide comes is most important, and another example can be given, namely, Karáchi harbour: for if the times of the tides are given even approximately correct on the Admiralty charts, then the tide which enters

Karáchi harbour comes from a south-westerly direction, and if so, then the intended breakwater off Munora Point will have the effect of making the tide have to travel a long distance round before entering the harbour, which can hardly have a beneficial effect on the entrance. The breakwater according to this view is therefore a mistake, and a long groyne at right angles to the current from the opposite side of the channel, as proposed by Captain Taylor, was the true remedy for removing the bar and deepening the entrance. It has been argued, however, that the breakwater off Munora Point is more of the character of a training wall for the outgoing current, in which case the action would be different and it would throw the bar into deeper water.

These examples show the necessity for the most careful tidal observations, not only on the actual spot where the works are contemplated, but also for some considerable distance in the adjacent seas.

The plan sometimes adopted, as in Back Bay for example, of running out breakwaters parallel with the coast line or the set of the tide, is quite useless (unless the timber erection in Back Bay was merely intended for a gangway). Such a structure does not break the sea, but the sea breaks it, and it is therefore ineffective for purposes of reclamation; where a solid breakwater is thrown out at Plymouth, the purpose and action are quite different.

They did not use battering rams in ancient warfare, for example, for breaking down doors and walls, with the beam sideways, but endways, and presently the wall or door was demolished. This is exactly similar to the action of a groyne thrown out seaward, and of which there are plenty of examples on the English coasts, and some imperfect ones in India, as at Gogo and Madras.

The plan adopted by General Tremenheere at the Indus mouths of throwing bottles into the sea has been pointed out by Maury to be very erroneous and unreliable for ascertaining the set of the tide or even a current, as there is no saying how great a circuit the bottles may have performed before arriving at their destination. The only means of obtaining exact data is by numerous actual observations of the tidal flow, and they should be reduced to one standard of time, and then lines drawn from point to point, where the times of highwater are the same at each point, would give an exact representation of the true co-tidal lines; but to accomplish this, even with the present known tidal data, would take considerable time and labour, for the period of highwater in all tide

tables is the local time at each place. This, however, the author may possibly take in hand *con amore* one of these days if he should have leisure; for the pursuits of science have their own reward, independent of any practical value such pursuits may have.

In Dr. Whewell's work on the tides he himself distinctly states that it is most incomplete and imperfect.

In applying these principles to the harbour of Bombay, it will be readily admitted how careful the tidal observations should be before commencing any new work. If Bombay were a place of minor importance, it would be a matter of secondary consequence, but it is the only really great port in Western India, and if not deteriorated it is likely to remain so. It would be better to have it a success like Hartlepool, Sunderland, Portland, and Grimsby, than a comparative failure like Dover, Holyhead, and some other places. And in order to obtain success it is of the greatest consequence that the tidal observations should be taken most carefully, not only within the boundaries of the harbour itself, but also in the seas adjacent, and the adjacent seas should also be well studied.

The effect of a "Direction Bank," for example, in diverting, retarding, or accelerating the tides outside, must influence and act upon those within the harbour of Bombay very materially; its growth will retard the flood tide, while the ebb will bring on to it and deposit silt, and the effect produced will be modified materially by the direction from which the tide ebbs and flows.

Getting within the limits of the harbour we find it a broad expanse of water divided into two forks or branches, one running up towards Tanna by Elephanta, and the other towards Sion past Mazagon: this latter has been injudiciously closed up at its head. The harbour has a number of small rocky islets on its surface, which are visible enough, and corresponding with these islands there are a number of pools or hollows, and these pools are almost of similar shape and dimensions to the islands, but of course inverted: they are like so many countersunk cups, and are not connected with each other by channels, but there is comparatively shallow ground all round them. The Great Eastern was anchored in one of them, and the Hog Island Dock is in another. It is believed that there is no chart of the harbour of Bombay which shows correctly either the contour of its bed, or with the co-tidal lines laid down thereon. The author prepared a contour model chart some time ago which was presented to His Excellency the Governor of Bombay, Sir

Seymour FitzGerald, but there are no means of laying down co-tidal lines, nor is it believed that sufficient observations have been taken to lay them down. The old charts of the Admiralty must be nearly obsolete, for great changes have taken place in the harbour since they were made.

Notwithstanding the absence of these tidal observations and contour charts of the harbour and the adjacent seas, works of the largest magnitude have been proposed, and some very costly ones carried out, and in the absence of charts no proper calculations can be made, or conclusions arrived at, as to the effect they may have when executed on the integrity of this noble harbour.

People are apt to answer, when told that such and such a work if carried out will cause and has caused a silting up, "Oh! yes, but it can be dredged;" but dredging is an expensive operation, especially in Bombay, and at best it is but a poor expedient, so that it is better to endeavour to lay out the works in such a way as to require no dredging, and it requires but a careful study of the tides to accomplish this.

As, for example, let a solid breakwater be run across from Elphinstone Works to Cross Island, and no-one can doubt but that the result would be a rapid silting up of the whole space in front of Mazagon up to Sion Creek, and any partial breakwater would of course have a like partial effect.

Another great point in connection with the tides is this. When building docks, open or locked, for example, the entrances should be in a line with the set of the tide, for if vessels have to make the entrance across the tideway, as has been proposed for some dock works in Bombay harbour, then seamen can easily comprehend how extremely difficult the passage into the entrance would be.

Reclaim all the low lands on the bunders of Bombay harbour by all means if desirable. Why not? But in doing so let it not be forgotten that all such reclamations curtail the quantity of incoming water, and in such curtailment thereof the outgoing tide is reduced in its scouring power; and it must also be remembered that there are many growing sandbanks outside, which want all the scour that can be given to them.

It would probably be much better to direct attention to the reclamation of those outlying rocks, in the direction of Colaba and beyond it, called the Prongs, and there is but very little doubt that the whole of that large space up to and beyond the new Lighthouse might be gradually reclaimed by the action of the sea alone, with the aid of

groynes suitably placed. If they could not be so, it would be contrary to what we know from experience in every other part of the world where similar works have been most successfully carried out.

Such a reclamation would not be costly, because the sea must be made to do most of the work, and groynes are not very expensive works, especially with stone on the spot: and such a reclamation would do no harm to, but would benefit, the harbour; but the action of the tides must be much more carefully studied than it has yet been before such a work could be begun.

ART. VI.—*Report on the portion of the African Coast in the Vicinity of Bunder Murayah, the chief port of the Mijjertheyn tribe of Somalis.* By Captain S. B. MILES, Bombay Staff Corps, and Acting 2nd Assistant Political Resident, Aden. Contributed by Government.

Read before the Society, August 17th, 1871.

Bunder Murayah, in lat. 11° 43' N., the chief port of the Mijjertheyn tribe of Somâl, is situated at the foot of the range of hills bearing the same name, which rise about a mile behind the town to a height of four thousand feet. The town extends nearly half a mile along the beach, and contains upwards of two hundred houses, about a quarter of which are built of sun-dried bricks, and the remainder of matting. The permanent population of the town is only some six or seven hundred, but during the trading season, when the kafilas arrive from the interior with gums and other produce, and the Arab merchants come across from the opposite coast, this estimate must be quite doubled. The largest and most conspicuous building is the Sultan's, situate at the back of the town; it is of Hadhramaut fashion, is several stories high, and was built forty years ago: there are several others also of the same style and almost as large. There are three mosques, all whitewashed, but all in rather a dilapidated state; the town also boasts a school, attended by thirty boys, who learn to read and write Arabic. The ranges of hills, of which Jebel Murayah forms part, correspond almost exactly in their formation and composition with those in some part of the opposite coast of Arabia; they are both of the same cream-coloured limestone, with sandstone, shale, quartz, &c., and the strata of both have the same confused appearance. I noticed no metallic signs here. The low narrow maritime plain in which Murayah lies extends eastward until it meets the spur forming Ras Feeluk; to the west of the town it gradually narrows until the sea washes the cliffs, thereby rendering the road to the next village, Wurba, difficult, and practicable only at low water. The soil of the plain is principally coral, with sand and fragments of rock washed down from the hills; it is well wooded with acacias, mimosa, &c., and Shora bushes, asclepias,

and aloes abound. There is, of course, no cultivation, but quite recently a few date trees have been planted near the town, and at the neighbouring village of Gurso a few plots of jowaree have been sown during the last three years as an experiment. Water is scarce, from the difficulty of excavating wells; the only well, named Eyl Teâze, is two miles from the town, and has to supply in addition both Gurso and Gesulli, which are destitute of sweet water: the supply from this well is good but of astringent quality. To the east of the town, distant 2½ miles, is the Wady Hakén (the Rio de Santo Pedro of the Portuguese); the course of this wady is a very short one, but it is fed by many torrents, and in the floods must be a deep and powerful stream. It forms the natural pass into the interior, and I explored it for twenty miles, passing two watering-places. The opening where it makes its exit is called Kurmo, and is about three hundred yards broad; it then bifurcates, one mouth entering the sea at Murayah and the other near Gurso, where it forms a "khor" or salt creek half a mile long, but barred in the dry season by the sandy beach: in the floods it is used as a shelter by bugalows and small boats.

The chain of hills bordering the N. and N. E. coast are described as extending three days' journey into the interior, when the country slopes down southwards and eastwards until it merges into an extensive hilly plain or plateau well, wooded and grassy and full of large game. No corn is raised and but little eaten, the inhabitants being purely nomadic, subsisting on their flocks and herds, and moving about for the convenience of pasturage. The country is, I imagine, but thinly peopled, and the permanent villages few, the Mijjertheyn being amongst the poorest of the Somâl, and not possessing the countless flocks of sheep owned by the Gulbêdh tribes.

The commerce of this coast is considerable, and is carried on with Moculla, Sheher, the Sowahil, Jiddah, and Bombay. The exports are frankincense, gum arabic, "mulij," indigo, and mats; for which, cloth, dates, rice, jowaree, and metals are imported in return. There are six large "buglas" belonging to these ports trading across the Indian Ocean to Bombay, besides several "sumbooks" that go to the opposite coast. The buglas rarely fill at one port, but coast along taking in cargo until full. The resources and productions of this country, especially vegetable, are much richer than might be expected from the exports, and only require to be developed for a valuable trade to spring up. Many useful gums, dyes, and oil-plants exist, of which no account whatever is

taken by the natives; the latter substance, for instance, is never expressed by them—they have, indeed, no word for it, and the very use of it is unknown, ghee being the substitute. Indigo grows wild and is sent to Moculla and Sheher, where there is a great demand for it. The mats are made almost exclusively of the "Ow" or leaf of the Doum (*Hyphœne*) and wild date palms, the latter being preferred; they are dyed of two colours only, red and black; the red dye is a mixture of aloes, "fooah," saltpetre, and camel's dung, but they are acquainted with several plants that produce a red dye. Mulij, or, as the Somâl call it Gero—the fruit of the Doum palm—is a nut with a hard and thick rind; it is cut in half, dried and strung for export. The kernel is perfectly insipid, and requires an immense deal of mastication; it has nothing to recommend it, but is much eaten by the Arabs as a restorative. Asclepias, senna, and aloe plants grow abundantly, but their medicinal and fibrous uses are unknown to the natives. No ivory, feathers, or skins are brought to these ports except by some chance party arriving from the Dulbanta country. The people possess but few cattle and still fewer horses. Animals and ghee are not exported now as formerly, all the ghee produced being consumed by themselves: even the coast people often have a difficulty in procuring it. The severe famine here in 1868 impoverished the country greatly, and the effects of it are still felt: it affected the neighbouring country of the Wursungalli also, but not to the same extent. A large portion of the inhabitants are said to have died of starvation, and thousands of animals—camels, sheep, and horses. One man was pointed out to me who had lost three hundred and eighty out of four hundred head of camels, and many were the stories of large proprietors who had been utterly ruined. Honey is as abundant here as in Arabia, but no liquor is made from it as in Abyssinia. There are two species of bee producing it—the "Neis" bee, which makes its nest in holes in the rocks; and the "Riddin," which prefers deserted ant-hills: the honey of the latter is superior. The most valuable products, however, of this country are its gums and resins. Gum arabic, tragacanth, myrrh, and many others are produced in abundance; and in no other country, except sparsely on the opposite coast of Arabia, does the olibanum or frankincense tree exist. The Somâl divide gums into two classes— sweet and bitter: to the former belong gum arabic, mastic, "luban mayeti," &c.; and to the latter myrrh, "hodthai," and others. There are at least three species of acacia producing the Sumugh or gum-arabic, and they are all very abundant: the bark is cut thrice only by the natives for the gum

to exude—if cut oftener the tree dies. I was told that the tree is cut only in this and the neighbouring province of Wursungalli; in the west the gum is allowed to exude naturally, and the natives learn when to collect it from a small insect named "Jirgah," which then begins to utter its note. The "hodthai" is a gum of peculiar quality; the tree is a thorny acacia not unlike the babool, but has a smooth bark. No leaves were on it at the time of my visit, but the berries and leaf-buds were beginning to sprout from the thorns. The gum issues in a thick milky mass or in small round lumps: when dry it becomes brittle. It is soluble in water, turning it quite milky. It is not exported, and the only use it is put to is, by men to whiten their shields, and by women to cleanse their hair. The tree producing the olibanum or frankincense, which is called by the Somâl "Beyu," grows only on the limestone ranges of this and the opposite coast. The beautiful and singular appearance of this tree, with its tapering stem and crimped foliage, attached to the smooth surface of the marble rock by its large, white, bulbous mass, and dotting the tops of the hills, where often no other verdure is to be seen, has been so often described that any further remarks are unnecessary. There are four different species of the tree, producing two distinct kinds of gum: the first and best kind, called Bedwi or Sheheri, comes from the Mohr Add, Mohr Madow, and Boido; the second kind, called Mayeti, is produced by the Yegaar. The Boido species is a taller tree than the others, and is so named from the gum running down in long tears. The Luban Bedwi is of three qualities, viz., Fusoos, Sâfee, and Mujundal; the first is the best, but for the last few years so many trees have been destroyed in this part by the drought that the little produced has been mixed with the second sort. The Mayeti is of one quality only, viz., Safai; it is very different in appearance from the Bedwi (which is in transparent drops), being of a milky white colour and in large masses or flakes. The Mohr Add and Madow trees are generally found further inland than the Yegaar, and from this I suspect the gum derives its name of Bedwi, being obtained by the coast-dwellers and merchants from the Bedouins of the interior. The Mayeti is exported chiefly to Jiddah and the Yemen ports: the Bedwi goes to Bombay for exportation to Europe. Numbers of the Somâl go across to Hadhramaut for the purpose of gathering the frankincense, paying the Arab tribes there for the privilege, the latter never attempting to collect it themselves. The Somalies usually settle there, selling the gum at Moculla and Sheher, until they have amassed a competency. The Arab

"Luban" is considered inferior to the African, which is termed "Asli" by the Arabs; probably the tree was imported into Arabia with the myrrh tree in very remote times. The season for gathering the gum lasts for four months—from May to September; the trees may be gashed any number of times without injury, but, unless rain falls soon after, the tree withers and dies. The gum is gathered fifteen days after the tree is cut, as it has then ceased to exude, and the bark, which heals rapidly, is again gashed. The knife with which the tree is cut is called "mingâf." The estate or plot of ground owned by each individual is called Hijjé, and is clearly defined and marked out, the trees in it being strictly respected by the other members of the tribe. The price of unsorted Luban paid to the Somâl by the Arab merchant was two pounds of jowaree for one pound of Bedwi, and one and a half pounds of jowaree for one pound of Mayeti. Besides the frankincense gum, the black and white Mohr trees yield a beautiful red dye, which is extracted from the thin papery bark. The Mayeti gum is as much used for chewing as it is for its sweet odour by the natives, and a blazing lump often serves for a light, instead of an oil-lamp. The trees, though growing wild, are carefully watched by the Somâl, and in some cases, I am told, they plant and propagate saplings in their fields; but this laudable custom, by which their wealth might be decupled, is too laborious to be universally followed.

The marriage ceremonies among these people differ considerably from those of the Arabs. The marriage portion paid to the girl's father is called "yerrud," and consists of from ten dollars to a hundred camels. It is not necessary to settle any dowry on the girl herself, and it is indeed seldom done. After betrothal the boy sometimes remains two or three years in his father-in-law's house for service, at the end of which he is sent back with presents often equal to or exceeding the "yerrud." Girls are sometimes carried off by force and married, and then, unless the parents are satisfied with a handsome present (which is usually done), war is sure to result. Boys, too, while tending flocks of cattle outside the village, are frequently carried off and held to ransom, in default of payment of which they are sometimes killed. In the horse countries marriages of wealthy people are celebrated with more ceremony and show, all the men of the tribe present turning out on horseback and going though mock combats, &c. Here a little dancing and tomtoming, with a feast to the villagers, embrace all the festivities. As there are no Cazees, any Mulla can read the Khûtbâ. After a seven days' honeymoon the bride returns to her parents for a time. No ceremonies are

observed on a birth; a girl comes into the world unnoticed, and the father is scarcely informed of it; if a boy he generally gives a dinner. The wife is rarely of the same tribe as her husband, the Somâl being very averse to marriages among relatives, however distant the connexion, and they are very Scotch-like in their recognition of kinship. Among the Mijjertheyn, the mother of any of the Sultan's children being of his tribe, or even of the "Darrood" division of Somâl, disqualifies them from the succession; the Sultan must be the son of a "Bhadir," a woman of the "Dir" division of the Somâl. Marriage between cousins—the rule with Arabs—is particularly abhorrent to them, but it has begun to obtain here of late in the Sultan's family and a few others, the example probably having been set by the Arab residents, or by Somalies returning from Arabia. The Somâl are particular about their honour and the reputation of their wives; widows are generally married by one of the husband's brothers or relations. It is customary for guests arriving from a journey to remain in the house during meals and for conversation only, and not to sleep there or occupy the house as an inmate.

The Khûtbâ in the mosques is read for the Sultan of Turkey, as it is in Aden; the Somâl know not of the Khedive of Egypt, and imagine the Sultan to be the ruler of the universe, and all European and Asiatic nations his subjects. Like all Africans, they are very superstitious, respect omens, believe in geomancy, and have a great dread of the evil eye and of witches, "Komayu," who are said to work spells on a man until he wastes away and dies. When a man meets one of these ladies he covers up his face and mutters God's name or the "Lahoul," and endeavours to terrify her by threats. They have no reverence for trees, heavenly bodies, &c., nor any traces remaining, with one or two remarkable exceptions, that I could discover, of their old paganism. They are troubled with but few diseases, and have little need of medicine; they have a remedy for ulcers, and know how to heal spear-wounds quickly by applying the powdered bark of the Kûrrârâ, which is a powerful styptic. The wound of a poisoned arrow is invariably cut out, but the universal panacea is the actual cautery; a good dose (a few pounds) of ghee is also very efficacious in internal complaints. Small-pox commits its ravages unchecked, inoculation being considered "harâm," any one undergoing it being doomed to eternal perdition.

The Mijjertheyn are considered by the Gulbêdh tribes as superior to them in two things, viz. security of life and property, and strictness in

religious duties, but are looked down upon for their poverty and meaner way of living. The Mijjertheyn, however, are superior to all the rest of the Somâl in the attention paid to education, a much larger proportion being able to read and write than in any other tribe. They have, unfortunately, managed to earn an indifferent reputation, from the treacherous murder, on several occasions, of shipwrecked seamen, but there are at least as many instances of their kindness and hospitality to those thrown on their shores, and I am inclined to think their behaviour is due more to the wanton and reckless acts of a savage than to any bloodthirstiness or cruelty of disposition inherent in them. This tribe alone, I believe, of all the Somâl, does not smoke tobacco, considering it "harâm;" the little required here and by the Wursungalli is imported from Moculla by the vessels taking guano from Burnt Island. The only trade followed here besides that of blacksmith, which is peculiar to the Tomâl, is that of sandal-making; the jewellery worn by the women is of Arab manufacture and is brought from Moculla. The arms used by the Somâl are a kreese, a buckler, and two spears or a bow and arrows; the spears used by them are of many different shapes and sizes, all having names. The bow and poisoned arrow are common to all the Somâl, but more especially the Wursungalli, who are very expert. The Mijjertheyn do not seem to be at all good shots; the bows they use are large—six feet—and the arrows about a foot and a half. The poison is here extracted from two trees—the Minhiddo and Abertehi—by Midgâns; no one, man or woman, must be present while it is being prepared, or it has no efficacy. The only means the Somâl have of obtaining fire is by the primitive method of rubbing two sticks together; three trees supply suitable wood for this—the Dêr, Néarer, and Khu. Flint and steel are unknown. The games of the Somâl are numerous but very simple; two of them are "Shâh" and "Shunterad;" the former is the favourite, and is played with twelve stones or shells: it is very similar to the Arabic game "Sudur." They are inveterate gamblers, and frequently lose all their property. From their intercourse with Aden, various Indian and English games are being gradually introduced among them.

Though the language spoken throughout the whole country is substantially the same, and a man of one part is intelligible in any other, yet the difference between the Burri and the Gulbêdh is at least as much as the difference between the Arabic of Egypt and Yemen; this lies noticeably in the idioms, and in the usage and pronunciation of certain words;

for instance, a camel in the Gulbêdh is called "Awur," in the Burri "Ratti;" a foot in the former is "Loog," in the latter "Uddin;" a girl is "Gubud" and "Gubuj" respectively.

The language, though not copious, seems expressive, and sounds not unpleasantly. The Somâl delight in similes and proverbs, and consider a speech consisting of a string of short sentences and aphorisms as the height of eloquence; they are always very anxious to speak well in council, and on such occasions the speaker is listened to with respectful attention until he has finished. They are not destitute of poetry, and frequently recite long poems or kasidehs, generally on the exploits of the tribe, like the Bedouin Arabs. I give a few specimens of their proverbs :—

Gud wulba bahulki kodai aiyar dalolkisu dunko jirra ôg.
Every animal knows the windings of its own hole.

Bedwi bunder gai wa dubêr masâjid gai.
A countryman in a town is like a donkey in a mosque.

Rug beyn wa shêga, beyn se ma mahmaho.
Men lie, but proverbs never.

Dôn ba aff eyn mugur ba ku wur heisa.
The reed is acquainted with both the water-hole and the mouth—*i.e.* he knows both sides of the case.

In durr laddista wa dodai in dul mughalu lunkudasi wa dêrta.
To wear white clothes is easy, but to become a citizen (in manners) takes long.

Regarding the origin of the Somâl, it seems more than probable they are descended from a number of Arabs who immigrated into the country, and, mixing with the Galla inhabitants, soon multiplied and drove back into the interior all those, Christian and Pagan, who refused to conform to their religion, and thus occupied the country they now hold. Their language and traditions both support this hypothesis. The former is composed almost wholly of words derived either from the Arabic or Galla tongues, the latter predominating, and their traditions universally refer to Arab ancestors, whom they hold in great veneration. They assign a period of between four and five centuries to this immigration, which was probably from Hadhramaut, and speak with pride of the readiness with which the Moslem faith was embraced, and the fact of its having been introduced without the intervention of the sword. I

learnt at Hunda that the Mahra tribes have a tradition that the Somâl are descended from them, and they call them invariably "Beni Am," or "cousins," to this day. The name of Somâl, and the time when they first began to be called by it, still remain in obscurity. I expected to have found some light on this point in the Kitâb Futuh-el Habsh, but have been disappointed, as that work gives no account whatever of the early history of this race. The root of the word in Arabic (صومل) is, according to the Kamoos, in one of its significations, "lofty hills covered with trees," and this name may have been applied to the country (and appropriately so) by the Arabs; but it does not appear to have been so known to the ancient writers, and it strikes me as possible that it may be an anagram of the word Mosyllon, the ancient name of Berbera or Kurrum: for the whole region, as far as Cape Guardafui, was called the Mosyllitic Coast. These are, however, mere conjectures. The Somâl distinguish between the two sides of their country by the terms Burri (the eastern) and Gulbêdh (the western); these are well known to and recognized by the Arabs, by whom they are named Makhar (ماخر) and Dabir (دابر) respectively. The former includes the Mijjertheyn, Wursungalli, and Dulbhanta tribes; the latter the Habr Awal, Habr Tul Jaala, and Habr Gerhajis, &c. These terms are quite territorial—not tribal, and are more comparative than nominal. Thus Berbera is Gulbêdh to Kurrum, and Meit is Burri to Ain Terâd. The Gulbêdh tribes are much more turbulent and predatory than the Burri, and are in a chronic state of warfare and anarchy; while the Burri are, as a rule, peaceable and orderly, and generally loth to shed blood. The same customs obtain through all the Somâl, and some of the old pagan rites are still retained. Like the races north and south of them—the Afer and Sowahili—the Somâl are of the Shafeea school of Moslems. The Mijjertheyn is the only tribe under the sway of a Sultan; the Habr Awal, Wursungalli, and Dulbhanta have Gerâds, and the Ugâden have a Chief called Ogass to reign over them: the authority of all of them is more or less nominal, and is almost limited to collecting men in war. The present Sultan of the Mijjertheyn is a boy of ten years of age, and the country is under the regency of his uncle, Moosa Othman, in association with three great-uncles. Moosa would have been elected Sultan on the death of his half-brother, Mahomed, according to custom, but he was ineligible, as I have already explained, on account of his mother being a Wursungalli, one of the Darrood tribes. The boy's mother is a Habr Gerhajis woman and a Bhadir. The Mijjertheyn are undeniably the

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most inoffensive of all the Somâl; their country is extensive, reaching from Koll to Gerâd, a town on the east coast a considerable distance south of Ras Hafoon. The "ashoor" collected at Bunder Murayah is distributed among the Bhadir families there; the Sultan receives a share of it at this and two or three other towns, but his revenue is decidedly limited. "Abbans," or protectors, have to be taken here, as at Berbera, by Arab and other merchants frequenting the port, but they do not receive the same percentage or commission, but merely a small present. In the Gulbêdh these men are necessary to the stranger; but here, where there is ample security of life and property, they are a mere tax.

There are three outcast tribes, namely, the Tomal, Midgân, and Ebir. The first are blacksmiths exclusively, making arrow and lance heads, fish-hooks, and such like small requirements of the people. The second, Midgân, are a very numerous body, and have no particular occupation, but usually engage themselves as servants, herdsmen, &c.; these two classes intermarry among themselves, and sometimes also with the Somâl. The last race, Ebir, are the pariahs of the land, and are distinct from and inferior to both the preceding; they are by profession jugglers, and perform at weddings and feasts: it is reported that they habitually sell their children, and they are never allowed to accompany the Somâl in their wars. The origin of these outcast tribes is unknown to me; they are undistinguishable from the Somâl in appearance or feature, and are not slaves—for there are plenty of these, domestic slavery being rife throughout the length and breadth of the Bur-el-Somâl.

The coast from Murayah to Alloola has three towns not laid down in the charts, namely, Gurso, Kesulli, and Habo. Alloola is a larger town than Murayah, but its houses are all of matting, there are none of brick; it has the advantage over the latter place of having a lagoon, or circular bay, affording very fair shelter for native craft, while Murayah is an open roadstead. The exports and imports of the two places are the same. Water is as scarce at Alloola as at Bunder Murayah; buglas generally water at a place a few miles east, named Booah, where there is an unfailing supply. Alloola and several of the neighbouring villages are inhabited mostly by the Sowarkeroon tribe, a savage clan of the Mijjertheyn. The country around and to the south belongs to the clan of Othman Mahomed. The inhabitants of this coast, though not exactly deserving Ptolemy's name of Troglodytes, are in truth little removed from savages, and use the holes and caves in the high range of hills overhanging the sea to store their products and articles of export in during the close

season. From Ras Asseer (Cape Guardafui) to Ras Hafoon the coast is bleak and sterile, with two or three fertile valleys. The northern half, to a little beyond Ras Binna (or Bashkail), is bold and precipitous, while the lower part is low and sandy. It is very thinly peopled, and has only two or three villages and one town, Hunda. The "khors" or bays on the north and south sides of Ras Hafoon are used as harbours during the south-west and north-east monsoons respectively; the isthmus is a narrow sandy strip six miles in breadth, and covered with camel grass and Shora bushes; there is a hamlet on each side, but sweet water is only obtainable on the south. On the top of the square table-land of Hafoon are extensive pastures, on which camels, horses, cattle, and sheep are grazed in the season. Fish are plentiful enough, and furnish the means of subsistence to the coast-dwellers, but the inland population hold fish as much in abhorrence as fowls. Sharks' fins, for China, are an important article of export, and several Mahra Arabs reside here for the purpose of capturing the fish. Hunda is a straggling town of mat huts extending over two miles, with a population varying from five hundred to one thousand, according to season. The men are all fishermen or frankincense-gatherers, and the women employ themselves in weaving mats, of which bales and bales were lying ready for shipment. The commerce of this place is confined to the Sowahil and the Arab ports Moculla and Sheher, the former supplying corn, and the latter cloth, dates, &c. The exports are "mulij," frankincense, shark-skins, ambergris, and matting. The supply of ivory has almost ceased, and there is only one elephant-hunter left in the town. The houses are all circular and portable, and are erected in two or three hours—a light framework of wood with a double layer of mats over it, and the house is complete; a small courtyard or kraal of thorns is then made in front. The doors all face north or south, according to season, as the wind is very high and inclement. At this time it was very cold, and the sharp contrast between the climate here and at Bunder Murayah, where the heat was peculiarly fiery and suffocating, was decidedly unpleasant. The country close around is low and barren, the soil being sand, detritus, and coral overlying limestone. Coral and shells are met with miles inland, showing that the country has been at some former period under water; the caverns and watermarks on the cliffs of Ras Hafoon are further evidence of this. The vegetation has the usual appearance—salsolaceous plants, with a few doum palms and a stunted growth of acacias scattered over the surface. About a mile to the north of Hunda the shore takes a

curve which is not marked in the chart; bugalows anchor here—the only sheltered spot to be found. I sounded seventeen feet close in. Close by is a large wady forming a salt lagoon in the monsoon; its broad shallow bed shows, however, that much of the rain is absorbed on its journey, and that little finds its way to the sea. The residence of the Sultan is at a place called Adowa, about thirty miles north-west of Hunda; it is close to the Wady Jael or Jumbulhoody. The halting-places between Hunda and Bunder Murayah are Sehow, Adowa, Modeyaum, Yerân, and Eylgâl, averaging about twenty miles from each other; the last place is in the Wady Yeran, which rises in a plateau of the same name, and enters the sea near Bunder Khor. Two other places near the road are Sussi and Gulool. The two most important valleys between Ras Asseer and Hafoon are the Wady Tohen and the Wady Jumbulhoody, called in its upper part the Wady Jael. The soil of the former is rich, and produces maize, tobacco, jowaree, dates, Theban palms, tamarinds, plantains, and onions; the introduction of most of these is due to a Hadhramaut Arab who settled here some years since, and taught the inhabitants how to cultivate them. The Somâl, I believe, are ready and willing enough to turn to agriculture and grow their own corn, but they require some one to set them the example. The eastern point of this country is formed of a series of hill-ranges or plateaux, known as Jebel Goraâl, Girdif, and Bor Burhai; they are tolerably well wooded, and are rich in valuable gum-trees—frankincense, dragon's blood, tragacanth, arabic, &c. And here I may remark what a very unnecessary mystery and puzzle has been made of the name given to this horn by the Portuguese—Cape Guardafui; Bruce insisted it should be called Gardefan, or the Straits of Burial, and others have derived it in ways equally fanciful—even the accurate Cruttenden was misled. It is, in fact, simply the native name for this part, and is the only one known to the inhabitants, viz., Girdif or Girdifo. By the local shipping and by pilots, however, the point is usually called by its Arab name, Ras Asseer. The only Europeans who have ever traversed this country were some of the troops belonging to the Bombay column of the army in Egypt in 1801. The transport in which they were returning to India having been wrecked near Ras Hafoon, they succeeded, after great hardships, in making their way along the coast to Bunder Alloola, where they were protected and entertained by the natives until they were taken off, about two months after. The watershed of all this country is the southern face of the high range of limestone hills fringing the

north coast, and, as indicated by the Nogâl, Jaeel, and other rivers on this coast, clearly lies from north-west to south-east. The Wady Jaeel, called in its upper part the Wady Gebee, rises, I was informed, somewhere near Currum, and after a course of 200 or 250 miles falls into the sea about ten miles below Ras Hafoon, at a place called Hashiree. The Wady Nogâl enters the sea at Illig, a place five days' journey further south.

The ancient geography of this coast, as given in the oldest and best account we have of it, the "Periplus of the Erythræan Sea," has become more clear and intelligible since our knowledge of it has increased, and we have had the accurate surveys of the Indian Navy to refer to for its elucidation. But although the more remarkable geographical features are easy of recognition, from the fidelity with which they are described by the author, there is yet considerable field left for conjecture with regard to many places. One cause of this is the want of uniformity in the names given, some being Greek, some native, and others Arabic; this is perplexing, and warns us not to rely too much on them, though one of our chief means of recognition.

The first place mentioned in the territory now occupied by the Somâl is Mundus; this I consider to be Zaila, on account of its description as a safe anchorage under the protection of an island—a circumstance that suits Zaila alone. The title of emporium given to it, the peculiarity of its exports, and the fact of the course being from hence eastward, are confirmatory of this view. We now come to Mosyllon, the most difficult, as it is the most important, of all the localities we have to discover the site of. It was the chief emporium on the coast, and is described as a promontory and a bad roadstead. According to the distances given, it ought to be carried at least a hundred miles further east, but in fixing it at Berbera the chief inducement is that the latter holds preëminently the same position that Mosyllon did, as the principal town on the coast, and this appears to me an argument of sufficient weight to turn the scale in its favour against all other considerations. The latitudes and longitudes of Ptolemy add greatly to the confusion here, for they are at variance, and irreconcilable under any circumstances. The evidence, in short, is against Berbera, but the presumption is much in favour of it. The river of Nilo-Ptolemæon may be fairly identified with the Wady Maareg at Meit—the distance given of two days' sail, or one thousand stadia (100 miles), coincides sufficiently. Tapategè is uncertain, for there is no clue, either of distance or site, to guide us,

and I can find no name at all similar to it, but it lies between Meit and Bunder Murayah. The locality of the lesser Daphnon is equally doubtful, and for the same reasons. It may possibly be the river near Bunder Khor or Butialo, called "Tugwena," "the large wady," by the natives. Cape Elephant is, of course, Ras Feeluk, known on the spot as Bor Moog. The greater Daphnon, or Akanuai, is unmistakeably identical with the Wady Hakên, or Rio de Santo Pedro of the Portuguese, which, as I have already described, debouches from the hills between Gurso and Murayah. This is the sole instance in which both the Greek and native names are given, and it enables us to establish the identity of the place beyond a doubt. The river Elephant must be the Wady Afkaliya, that enters the sea near Alloola, a short distance east of Ras Feeluk. From this there is no place mentioned until Cape Aromata or Guardafui, the most prominent feature on the coast, whereas we are expressly told the coast falls to the south. Continuing along here, the first name we come to, Tabai, was formerly identified by Dean Vincent with Hafoon, but it must now be referred to Ras Binna, reserving Hafoon for Oponè. The description of Tabai, the name (given by Ptolemy as Panon Komè, evidently the village of Binna), and the distances, are sufficiently conclusive on this point. Between Aromata and Tabai also it is called the Bay of Beyla; now Belwa is a village about twenty miles from Binna, being at the north of the bay of which Ras Binna is the southern point. That Oponè or Ophonè is Hafoon cannot be doubted—the similarity of name is too striking to be passed over, and the fact of it being called an emporium, a character it still deserves, puts it beyond dispute. There is no port anywhere near to the south that answers to the description at all, while the whole produce of the valley of the Jaeel is brought here, and Cruttenden, who compares the fair to that of Berbera, testifies to the number of merchants resorting to it, and to the value and briskness of the trade carried on.

Having found time, whilst waiting at Hunda, to pay a hasty visit to the Wady Jacel, the luxuriant vegetation of which was described to me in very eulogistic terms by the natives, I hired a camel and started one afternoon in company with five Somalies. Our direction at first lay S.S.W. as far as Bor Kalha, a low plateau of seven or eight hundred feet elevation, when we turned W.S.W., and after three hours halted for the night at the edge of Khor Hurdea. At midnight we rose again and made our way over a plain of sand-hills topped with bushes to Eyl Dokanaya, a bubbling spring of brackish water on a low eminence,

which we reached just about sunrise. Large numbers of female camels were being watered at this and at a similar spring close by. The water was quite warm when we arrived, but became cold as the day advanced. Below the sand the hillock appeared to be composed chiefly of sandstone, but also limestone and agglomerate. The north point of Hafoon lies direct east of this, and the edge of the table-land north of Hunda E.N.E. After resting here for a short time, and receiving the customary peace-offering of camels' milk from the Bedouins, we pushed on again, and travelled for some hours over a sterile, stony plain, thinly grown here and there with acacias, until we reached the Wady Jaeel, along the steep bank of which we continued until we found a path, when we descended and camped in a high well-sheltered patch or island in the bed. On approaching the wady, the appearance of it at a little distance—a bright green streak in a brown, sterile, and hilly plain—was singularly pleasant and refreshing. The banks are deep and precipitous, varying from fifty to two hundred feet, and the bed is in no part less than seven hundred yards wide, and in most places much more, showing that a very considerable body of water is carried down in the monsoon. The bed is extremely well wooded with some large trees, especially in the centre, where the ground is high, forming islands in the flood; the wild date and doum palms were particularly abundant, the fruit and leaves being an important article of commerce. At this time no water was running, but there were long shallow pools or reaches in places, and it could be obtained anywhere by digging a foot or two deep in the sand. The few people I saw were very friendly, and appeared quiet and industrious, but miserably poor; the men were employed in splitting, drying, and stringing "mulij," and the women in mat-weaving: their mat huts were scattered all along the wady, with thorn kraals for the few half-starved sheep and goats. There is no cultivation, and the fruit of the wild date seems a staple article of food. The river is said to have been the resort of wild elephants until three years ago; since then they have only reappeared once. The next morning we pursued our journey up the wady, direction west, passing after a short time a broad, deep wady on our left, called the "Tug Bedoo," and about 1 P. M. halted near Bor Mogâh, a high tabular-formed hill. The character of the country remained unchanged, but the vegetation in the bed of the wady gradually decreased, while the banks became deeper. The universal drought in the country had visited this place; they had hardly had any rain for a year, and the river was dry in consequence. All human

habitations had now ceased, and I was told that none were to be met with for a long distance in front; I therefore saw no advantage in pushing on, and began to retrace my steps. We returned by the same road, and arrived at Hunda the second day. From the time of actual travelling on both ways, thirty-six hours, I had probably ascended the river about forty-five or fifty miles. The hills were all entirely destitute of verdure, and I saw no frankincense or gum-arabic trees anywhere on the journey; the only animals I noticed were the hyena, jackal, hare, and two species of antelope, and there were said to be leopards. Birds were very numerous in the wady, but none on the plains.

The Bur-el-Somâl is altogether a most interesting country, and it is no little opprobrium to us that it has remained so long a mystery, for there are few which offer greater attractions of research and greater facilities for exploration to the traveller. True, we have had a few glimpses at it, and the writings of Cruttenden, Rigby, and others have left little to be gleaned superficially, but how little we know of the interior, and of the tribes beyond the immediate seaboard: absolutely nothing! The geography, resources, and productions of the country; the condition, distribution, and inner life of the people, have all yet to be written, and offer a wide field for inquiry to the first European who shall visit them.

Supplementary Vocabulary of Somali Language.

English.	Somali.	English.	Somali.
Abomination	Dthair, mukruh.	Betrothed	Donunta
Abuse	Eice.	Big toe	Sôl.
Accept (to)	Ugaroh, yail.	Bird of prey	Hadth ka adug.
Accuse (to)	Bidthai, tohm.	Bite (to)	Gânin.
Across	Tulâb.	Bitter	Kurrâd.
Adultery	Sinno.	Blade	Birti.
Admonish	Wâno, tulh, luttuli	Blood-money	Mugk.
Affirm (to)	Wa kaga, wa yeha	Boast (to)	Fân.
Affray	Dirir, dugâl.	Boil (to)	Kurri, kûl.
Alive	Wa nolaya.	Bottom of vessel.	Sulki, gonti.
Almond	Yeib.	Boundary	Sorin.
Amber	Mekkawi.	Bracelet	Kurdâs.
Amulet	Merdas, musalleh.	Brain	Muskah.
Ancestor	Awoowa.	Branch	Kûd, lân.
Ancle	Unko.	Breast-bone	Sakár.
Angry	Arro.	Breath	Naif.
Answer	Ille.	Bring (to)	Kusso, kén.
Ant, white	Eboor.	Bring forth (to)	Umul.
Ant-hill	Dundumo.	Broad	Bulâd.
Antelope	Soghâro.	Broom	Mufeek.
Anything	Wah.	Browse—to graze	Dâk.
Apartment	Kakôba.	Bud, blossom	Mirro.
Appearance	Mithub.	Bury (to)	Nabâl, âs.
Archery	Dunin.	Bulrush	Allâlo.
Arid	Ingêg, abâra.	Bush, brushwood	Lan.
Ascertain (to)	Hûbso.	Bustard	Waradâda.
Assent	Ogul.	Bustle—woman's	Shushob.
Asthma	Khaho.		
Awake	Sujêda.	Calf	Wêlu.
Awl	Hainsa tule.	Calf—of leg	Kôb.
		Call out (to)	Geilo.
Bait	Lâf.	Camel	Geyl, ratti.
Bank—of river	Kûrh, dân.	Camel, young	Nirgu.
Bark—of tree	Jirrif, myrah.	Cameleer	Geylijir.
Bark (to) (a dog)	Aeya.	Carpenter	Kurâr.
Basin, wooden	Hêro.	Centipede	Angarâra.
Beads	Kharaz.	Chain	Silsila.
Beak	Affki.	Chameleon	Rattrjirjiroli.
Beard	Bud.	Cheap	Wajibaya.
Bedstead	Sereer.	Chest	Lâbta.
Begin (to)	Yakaeen, Hûreyn	Chew (to)	Rabsi.
Believe (to)	Rumeiso.	Chief, elder	Bogor.

English.	Somali.	English.	Somali.
Child	Inan, ilmo.	Drop	Tifikh, diba.
Cholera	Dabahow.	Drought	Abar.
Circle	Jirinjir.	Dung	Salo.
Clever	Waeel.		
Clothes	Sõf.	Eagle	Nabodi.
Cloudy	Hôsis.	Earring	Hil kutho.
Club	Bûdth.	Earthen vessels	Hân, jelhud, kalah.
Collar-bone	Kulhun, koreis.		
Colour	Assal.	East	Kurru ka sohbi.
Comb	Suguf.	Easy	Yesir.
Come (to)	Laimo, emi.	Eclipse	Madobahti.
Coney	Bouna.	Edge	Affki.
Cooking-pot	Dirri.	Enough	Bis, iskudda.
Coral	Shaab.	Envoy	Urgi.
Corner	Gês, burbur.	Especially	Bahan.
Cousin	Ilmo ader.	Estate	Hijje.
Cover	Dabôl.	Evening	Gulâb.
Cowherd	Lohjir.	Evil-eye	Il.
Cowry	Alêl.	Exaggerate	Gâsi, kûsin.
Crab	Singo.	Extra, irrespective	Hoorhor.
Crack	Dilláh.		
Crest, ridge	Door.	Faint	Sôhadin.
Crooked	Kuloh.	Family	Jûb, rer.
Crow	Tuker.	Father-in-law	Sûdûg.
Crowd	Shir.	Face	Hagâg.
		Fetlock	Umaoôn.
Dance	Sâb, shirbo.	Fibre	Myrah.
Daughter-in-law.	Saduk banoliai.	File	Sofa.
Decrease (to)	Wa dinmaya.	Fire-place	Dhurdâr.
Deer	Garanook, baira.	Fire-sticks	Mudug.
Demand in marriage	Dân.	Flay (to)	Kul.
Device	Tub, ebâro.	Flea	Anjirbodu, tukfi.
Dig (to)	Kôd.	Flower	Mun, obâh.
Discourse	Nuk.	Foal	Durmân.
Divorce	Tulak, fûrrai.	Fold—for cattle.	Duri.
Divination	Fal.	Foolish	Fûdthêd.
Doum palm, fruit of	Mulij, gêru, hêgo,	Foot	Loog, uddin.
Dress, man's	Murro, hôd, kaid	Forefinger	Murdisso.
Dress, woman's	Murro gur, gúl.	Forge	Dubud.
Drive (to)	Kahai, wud.	Fork	Dadáb.
Dry (to)	Wudh.	Frame—of house.	Diggo.
		Fresh	Usub.
		Friend	Gânsâr, wajaal.

English.	Somali.	English.	Somali.
Fruit	Murro.	Indignant	Oomul, arro.
Gash	Dawa, kon.	Indigo	Gubuldi.
Ghaut	Kurrin.	Influenza	Hêrgôb.
Ghee-dubba	Komba.	Information	Og.
Ghost	Wagobi.	Jay	Dodooli.
Giddy	Warér.	Join (to)	Kubun.
Gift	Soreea.	Joint	Hubin.
Giraffe	Hulgirri.	Jowaree	Phirphira.
Go	Tug, sôh.	Khareef season	Haja, gôgi.
God	Ebâhi.	Kidnap (to)	Wa kubbo.
Grandmother	Aiyeyu.	Kindle (to)	Shid
Grasshopper	Kûbûja.	Kindred	Dowanunai, yesudunai.
Grief	Eil.	Kind	Maaroof.
Grinder-tooth	Gôs.	Knave	Naâs.
Grouse—sand	Fuku.	Knife	Mingaf, mindi.
Grow (to)	Wa kuri.	Lake	Jiddan.
Grunt (to)	Abâdh.	Lamb	Neelo.
Guano	Rubsh.	Leather bag	Ohle.
Guest	Murti.	Leopard	Shabêl.
Gull—sea	Heibjog.	Leprosy	Burus.
Handle	Dabki.	Let go	Seeda dibi!
Hard	Adag.	Lick (to)	Lêf.
Hatchet	Gudimo.	Limp (to)	Dutis.
Head-dress, man's	Firrên, kori bâl.	Line, fishing	Edâd.
Head-dress, woman's	Gumbo.	Line, straight	Jerrah.
Henna	Elân.	Liver	Bêr.
Herdsman, shepherd	Bulsho, kûrjog.	Lizard	Gurêta, molah.
Heron	Moosa, hôr.	Locust, young	Kûrunkûro.
Hippopotamus	Jêr.	Lynx	Jumbil.
Hock	Shirhi.	Lift (to)	Sid.
Hook	Hângôr.	Luck	Aian.
Hoopoe	Gobcyahan.	Marrow	Dûh.
Hospitable	Deksi.	Matting	Dingâh.
House	Min, agul.	Mature	Kungâd.
Human being	Kôf, rug.	Mark	Tilman.
Hyena	Wuraba, durwa.	Meteor	Wurrun.
Iguana	Munso.	Midwife	Amaliso.
Imagination	Mulha.	Milk-jug	Del.
Improper	Maeka.		

English.	Somali.	English.	Somali.
Mist	Eiriyan.	Proverb	Mahmah.
Moon, phases of	Adoo, gudur.	Pull (to)	Jid.
Mother-in-law	Sadoh.	Putrid	Kurrun, dûg.
Moustache	Sharob.		
Mungoose	Sogor, kadaf.	Ransom	Mutha furrûd.
Mussuck	Kurbid, hûb.	Recognize (to)	Gûrrun.
		Relate (to)	Sheiga.
Necklace	Kôl, jilbud.	Retreat (to)	Dûrug, bagha.
Needle	Mudtha, arbad.	Return (to)	Sônogo.
Night attack	Mirr.	Rhinoceros	Weeil.
Nipple	Nâs.	Ribs, true	Surur.
Noon	Had kurru.	Ribs, false	Dinah.
Nullah	Ill, tug, deh.	Robbers, gang of	Ghatha, kowlo.
Number	Tirro.	Road	Hillin,doh, toob.
Ochre, red	Dobo.	Sailor	Sôfan.
Old woman	Dûk, habr.	Satire	Madh.
Only son	Muddi.	Satiated	Dirgi.
Ordeal	Dubmurris.	Seasons	Kurrun, dtheyir, heis.
Ornament	Seâghat.		
Oppressed	Ell.	Season—trading	Bud furan.
		Season—close	Bud hiran.
Palm of hand	Bâbâoh.	Seaweed	Saaf.
Partition wall	Kakoba.	Secretly	Goomo, doomo.
Pasture	Gedu, doho.	Screen	Lahed.
Patience	Sabr.	Seize (to)	Kubbo, kakad.
Peace	Mubbud.	Senna	Jelleli.
Pebbles	Gorôro.	Separately	Gooni.
Peel	Dér, jirrif.	Shake (to)	Gereer.
Peel (to)	Dil.	Shank	Dûdun.
Petticoat	Haiman, tufih.	Shell	Gûmbal.
Phlebotomy	Toobin.	Shin	Hûg.
Pith	Dûh.	Side	Dun, owlul.
Plan, outline	Haredth.	Sinew	Bugun.
Plummet	Buldi.	Smooth	Dalâl.
Poetry	Gayrâri.	Sole of foot	Ugti.
Poor	Sabol.	Song	Gobai, hes.
Porcupine	Hor, anakob.	Sound, noise	Sunkâd.
Porpoise	Hûmbero.	South wind	Foora.
Portion(marriage)	Yerrud.	Spear-stick	Lameyu, dubbi.
Post	Udubteer.	Split	Jeha.
Potter	Deriasumeis.	Spoon	Fundâl.
Praying	Watukanaya.	Squirrel	Dabagâlli.

English.	Somali.	English.	Somali.
Steal (to).....	Toogo, hud.	Turtle	Deen.
Stone	Ukûd, kûreed, ludeb.	Twilight	Feedth.
		Tyranny	Gûrdûr.
Stopper	Fârr.		
Stout	Boorun.	Waist	Dubr.
Surplus	Dêrah.	Wasp	Dibirlâh.
Swallow (to) ...	Luk.	Watcher of herds	Allola, egy.
Sweep (to)	Feek, hadth.	Water-hole	Lâs, mugur.
Sweet	Mahân.	Wax.....	Hunja.
		Weave (to)	Fulki, fulôg.
Tail	Dubbo.	West	Kurru ka dah.
Taste	Duddin.	Wheat	Gurreen.
Tear (to)	Jer, dilâh.	Widow	Armali.
Tent-peg	Dissun.	Wig	Teemo arbedh.
Thatch.....	Rurro,kibid,hurur	Wild animals,carnivorous	Bâhal.
Thong	Son.	Wild animals, herbivorous ...	Ugâd.
Threaten (to) ...	Absi, dugal.	Window	Takat.
Thumb.....	Sôl.	Witch	Komeyu, dâbato.
Tight	Haj.	Wizard	Komê, bida.
Tongs	Bilkâb.	Wood, heart of...	Lufti.
Top	Dôr.	Woodpecker ...	Eyoo, dandante.
Torrent	Dâd.		
Tracks	Rhâd.		
Tremble (to) ...	Kudkud.		
Trunk of elephant	Gân.	Young of wild beasts	Daláh.
Tube	Dôn.		

List of useful Trees and Plants.

Nos.	Names of Trees.	Uses.
1	Humâr (T. Indica)	The tamarind tree.
2	Weggir (Diospyrus Ebenus)	The ebony tree.
3	Dar (Aloe vulgaris)	The aloe plant.
4	Ǫw (Hyphæne Thebaica)	The doum palm.
5	Meiro (Phœnix dactylifera)?	The wild date.
6	Gubuldi (Indigofera)	The wild indigo plant.
7	Jellelo Geyl (Cassia Senna)	The senna plant.
8	Jellelo Ari (Cassia)	Do. do.
9	Ankokib (Acacia vera)	Yields gum-arabic.
10	Adâd (Acacia)	Do. do.
11	Kurrâa (Acacia Babool)	Medicinal, fibrous, &c.
12	Yeib (Amygdalus communis)	The almond tree.
13	Mohr Add (Boswellia Bháu Dájiana)	The frankincense tree.
14	Mohr Madow (B. Carterii)	Do. do.
15	Boido (Boswellia —)	Do. do.
16	Yegaar (B. Frereana)	Do. do.
17	Deyib (Cedrus —)	The cedar tree.
18	Hassahdin (Pinus)	The Somali pine tree.
19	Didthin (B. Myrrha)	The myrrh tree.
20	Bôh (Asclepias gigantea)	Medicinal, fibrous, &c.
21	Gôb (Rhamnus Nebeca)	The jujube tree.
22	Hodthai	Yields a gum.
23	Gegabood	Medicinal.
24	Debbi	Lance-sticks and clubs.
25	Jirmal	Bark used in tanning, &c.
26	Higlo	Fruit eaten.
27	Ilkattus (Mimosa Serissa)	The Sirrus tree.
28	Gararoor	Edible berry.
29	Marêr	Fruit and timber tree. (Fruit eaten.)
30	Ohob	Yields gum.
31	Gûmûr	Yields a fragrant gum.
32	Fillah fillah	The Arâk tree.
33	Adthi (Capparis Sodata?)	Twigs used in basket-making.
34	Maroh	Do. do.
35	Nidik	Yields gum.
36	Karûn	Gum and fruit tree.
37	Murayo	Fruit tree.
38	Dafaroor	

Nos.	Names of Trees.	Uses.
39	Sûksûk	Fibrous.
40	Durni (Ficus religiosa)	The peepul tree.
41	Birda (Ficus Indica)	The banian tree.
42	Doususso (Pistachia lentiscus)	Yields gum mastic.
43	Gulool	Bark fibrous, and yields red dye.
44	Angeel	Valuable timber and fruit tree.
45	Habaghadi	Yields gum.
46	Hig (Aloe)	Fibrous.
47	Minhiddo	Poison extracted for arrows.
48	Abertchi	Do. do.
49	Dunkûl	Do. do.
50	Owbutta	Yields gum.
51	Kaba Asaya	Yields a red dye.
52	Foonh (Rubia Tinctoria)	The madder plant.

ART. VII.—*Journal of the Excursion made by* Captain S. B. MILES, *Bombay Staff Corps, in company with* Mons. MUNZINGER, *from Howr, returning to Aden through the Fudhli Country, giving a general description of the country and of the several Arab tribes occupying it; as also a Report upon the Geography of the District by* Mons. MUNZINGER. Contributed by Government.

The country between Bir Ali and Aden, through which we passed, is occupied by four large tribes, the Wahidi, Deaybi, Owlaki, and Fudhli.* These, with most other native tribes in South Arabia, became independent about 100 years ago, when the dominion of the Imaam of Sanaa (which had risen again since the expulsion of the Turks in 1630) came to an end over Yemen, and was confined to the walls of their own city. The old and simple patriarchal form of government was re-established by them; the leading man of a number of families becoming the Chief, or "Sultan" as he is termed, and retaining the succession hereditary in his family. This Sultan has no real despotic power, and is unable to take the life of any member of the tribe; he is indeed answerable to them for all his acts and proceedings, and his decisions, whether civil or criminal, to be respected, must be in accordance with the law of their religion and the customs of the tribes. In cases of emergency he consults the Sheikhs of the sub-tribes, whose advice he is bound to take, and act in accordance with, and in cases where the members of the tribe are not satisfied with their decisions, and in matters of dispute with other tribes, a council of Shereefs or Syuds is called for the final adjustment of the difficulty. These Shereefs are a great power in the State, and exert almost unbounded influence over the tribes in Hydramaut and E. Yemen; even among the wild Bedouins of the hills they are held in respect and awe, from their descent and consequent sanctity, and their superior learning. Few important matters, indeed, are discussed or entered upon without consulting them and obtaining their approval, and their advice is sought by all. In ceremonies, too, they often take precedence even of the Sultan: many of them make it their special business to act as peace-makers between contending tribes. These men are well known all over the country, and their mere presence is often sufficient to put off

an impending conflict. The want of authority and power among these Sultans, despite their magniloquent appellation, may be accounted for by the absence of wealth or any large source of income on their part—the only means they have being the Ashoor, a sort of property tax, and transit dues, besides the profits arising from any landed property of their own. Most of this income, from whatever source derived, has to be paid away to the Bedouins as a retainer for their services when required, and to restrain them from lawless acts. There are no men of any real wealth in the country; indeed, the universal equality of fortune is rather a remarkable feature in this land. The form of government and relation of the different parts of the tribes, curious as they seem, are quite in accordance with the genius of the people, as is proved by their existence from the earliest times, and admit perhaps of a greater degree of personal freedom than that of any other country.

The population may be divided broadly into two classes, the settled agricultural people and the Bedouins; the former hold their land upon a military tenure, engaging to serve in time of war when called on and also pay a certain portion of their crops to the Sultan; the Bedouins subsist upon their camels, goats, &c., and what they can obtain from the Sultan, and from travellers, upon whom they levy a Syara, or road-tax. There are no nomads. The first of the four tribes I have mentioned to be noticed is the Deaybi, the smallest perhaps, but by no means the least interesting. The strip of country they occupy lies between the Wahidees and Awalik, and extends from the sea-coast to about 50 miles inland; it includes also a portion of the Wady Meifah, which they have obtained by purchase. They have no Sultan or Sheikh over them collectively, but each of their seven divisions, of which the largest is the Hull Abdullah, is under an Aba or father. They are undoubtedly descendants of the Himyarites, and are not a little proud of the name: they use it to this day as their war-cry; and the neighbouring tribes call them Deaybees or Himyars indifferently. They still retain, too, their ancient language, doubtless one of the several dialects of the Sabæan. It appears to be different from the Mahra. They do not speak Arabic with any purity, though most of them are acquainted with it, but mingle a great number of their own words, so much so as to be at times almost unintelligible.

The Deaybees are, in short, a very interesting people, and well worthy of a careful study. A short sojourn among them would, I am sure,

amply repay in its results any one who would undertake it. The other tribes around, who also trace their descent from the Himyars, are the Yafai, Naaman, Gūmmúsh, and Merkashi; the family descent of the first, however, I am doubtful about, and of the second I have no information. The Deaybees have a bad reputation everywhere for their marauding and rapacious propensities; but of the truth, or otherwise, of this, I had no opportunity of judging. To speak as I found them, I entertained a favourable opinion of their character.

The Wahidee tribe, one of the largest on this coast, takes its name from the founder, Abdul Wahyd, a celebrated Koreish chieftain who conquered a large portion of territory from the surrounding tribes, and established his principal residence at Habban, a town formerly of considerable importance. This tribe has lately become divided, and is at present ruled over by three different Sultans, viz. Sultan Ahmed of Habban, Sultan Hadi Abdulla of Bir Ali, and Sultan Saleh Ñasir of Ezān; but their power, as I have observed, is merely nominal, and they are scarcely richer or better off than many of their subjects.

This tribe, whatever it may have been once, is not now held in much respect or fear by its neighbours for its warlike spirit or bravery; it is indeed, probably one of the least aggressive tribes in the country. They possess in the Wady Meifah one of the most fertile and productive districts of E. Yemen, and have consequently settled down for the most part into peaceful tillers of the soil, fighting only when necessary to repel marauding intruders. There are several large and thriving towns in this region, of which the two largest and more important are Hota and Habban. The former consists of an assemblage of lofty, detached, castle-like houses, and presents on the first approach a very striking and singular appearance. It is situated in a gorge of the hill on the banks of the Wady Amazcen, girt round on every side with high and almost inaccessible cliffs: hemmed in by these, and unapproachable except by the Wady, the form and size of the houses would enable the inhabitants to resist successfully an attacking Arab force.

The houses are of six to eight stories high, with very small windows, none of which are within ten feet of the ground, and the rooms are so low that one is barely able to stand upright in them. The average height of the houses appears to be about sixty feet; the material of which they are built is a tenacious clay mixed with lime, and the bricks made of his are so strong, though merely sun-dried, that several days' continued

rain does not affect them in the least. In the town proper there may be two hundred houses, and along the sides of the Wady, towards Kail, perhaps three times as many more: altogether I should put down the population at from 8,000 to 9,000 souls. The government is administered by a Sheikh named Sheikh Ahmed el Haider, under the Sultan of Habban, for whom he is supposed to collect the taxes, receiving a certain share for himself. He appears to have considerable influence over the people. There is a Cazee, but he is subordinate to the one at Habban, and is a man of no learning.

There are two mosques in the town, a surprising and significant circumstance when we consider the size of the population. The Khutba is read for the Sultan of Habban. The inhabitants are all musheikhs, or 'descendants' of some great saint, and consider themselves superior to, and almost independent of, the rest of the tribe. They are a taller, fairer, and more slender race than the other Arabs we had met, and wear their long curly hair loose, or fastened behind by a band. They appeared an ignorant and superstitious people, and consequently very bigoted and fanatical; yet they are by no means strict Moslems, and are very lax in their religious duties, neglecting their daily prayers, except on Fridays, when the Sheikh, followed by a large crowd, proceeded in state to the mosque.

The conversation of the men was almost entirely free from the pious ejaculations so common in the mouths of Moslems in all countries. The women are very fair, but with a slight yellowish tint; of their looks I will say nothing, the general absence of female loveliness in Yemen being proverbial. They are dressed in the usual hideous long blue blouse or loose gown of the country, and their hair is worn in long ringlets round the head, which is rather becoming; they go about unveiled, and appear to have more freedom than is generally accorded to the sex in Moslem towns.

The grains sown here are wheat, jowaree, bajree, barley, and tahef, and four crops are reaped yearly, viz., one rain crop and three irrigation. The fields are very neat and regular, and the state of the cultivation generally very superior: the rotation of crops is observed.

The Wady is bunded for irrigation by numerous stone walls, for which the wells afford an abundant supply of good water, which is drawn up by bullocks, the mote system of India being employed. I

did not notice any difference between the agricultural implements here and those in use near Aden. There are no fruits cultivated besides dates and lemons. The few cattle owned by the inhabitants are sent to the neighbouring deserts to graze under charge of Bedouins; sheep and goats are numerous; but there are no horses—these were introduced once, but the want of pasture rendered it difficult to keep them, and they soon disappeared. The only manufactures are a thick felt for camel saddles—in which both men and women are employed—and a coarse cloth for lûngis; the woof of this is spun by the women. Dyeing is carried on extensively, the indigo being imported from Bir Ali and Aden; for, besides their own manufacture, they prefer to import cloth from Aden unbleached, and dye it themselves, considering it cheaper. Blue is the universal colour worn here by both sexes, and we found no other dye used.

There are a few carpenters and blacksmiths in the town; the goldsmiths are Jews from the colony at Habban, who travel about the country, working where required. Hota has no market; but once a year, on the 12th Rajab, a great fair is held at the shrine of a certain saint near, at which the Bedouins assemble in numbers, and exchange their products for the various commodities they are in want of, such as cloth, dates, &c. At other times there is little traffic going on; indeed, as will be perceived, the internal commerce of this country must be small, from the simple habits and few personal wants of the people, which render them almost independent of external sources of supply. Their ordinary food consists simply of coarse jowaree or bajree bread with ghee and dates, which are much eaten; very little rice is consumed; and the Arabs are not vegetarians by any means. The only beverage is Kishr, which here is an infusion of both coffee bean and husk. In Sanaa, W. Yemen, and Aden the husk alone is used; in Hydramaut they infuse the bean only.

A Hydrami never dreams of setting forth on a journey without taking his coffee with him. Kishr is not a very tempting drink, especially with the ground ginger and cardamoms with which it is always prepared; it is in taste very like weak coffee, or perhaps like the mixture of tea and coffee drunk formerly under the name of twist in England. The husk, however, in these parts is more esteemed than the bean, as being less heating, and in the Aden bazaar it is more expensive, costing a shilling a pound. There is but one Fakih or

learned man in Hota, and there are no schools, but a few boys receive a little instruction during the month of Ramzan. Literature and art are at a very low ebb; indeed, they can scarcely be said to exist. Most of the Shereefs know how to write, and generally also the higher Sheikhs; but we neither met with nor heard of any real scholars, such as W. Yemen is able to boast of. The climate here during our stay was delightful, the air being light and exhilarating; at night it became quite cold, and we generally had a cool breeze throughout the day. It appears, however, to be a feverish and unhealthy place. We noticed very few old men in this district.

The town of Habban is irregularly built, on very uneven ground, in the midst of a plain of some 60 square miles in extent, interspersed with low hills of various heights and intersected by nullahs. This plain is bounded by a table range of hills to the north, and irregular serrated ranges to the south and east; its elevation is about 3,000 feet. Habban is not a large town, and contains only about 250 houses and between 2,000 and 3,000 inhabitants. There are, however, numerous Bedouin houses outside in every direction. The Jews number about 400 and dwell in a separate quarter; they have been here beyond tradition; and this is one of their principal colonies. Though very industrious they are wretchedly poor, and are not allowed to own any part of the soil: they are chiefly artizans, journeymen gold and silver smiths, &c.: the women rear great quantities of poultry.

On two eminences near the town are two watch-towers, each containing five guards, who keep a look-out over the surrounding country, and give notice of an approaching enemy. The houses are of much the same structure as at Hota, and of the same mud-coloured appearance. There is a small market. The fields around produce wheat, barley, tahef, jowaree, kinnib (dagoosa), and bajree, but no dates, coffee, or cotton. Indigo grows wild; and a species of aloe, of the fibre of which the common white rope of the country is made, grows abundantly. Cattle, sheep, and goats are scarce and dear. The supply of water is very limited, and procured only with difficulty from deep wells. This scarcity of water is the cause of the very limited extent of cultivation round the town, preventing artificial irrigation, and leaving the fields dependent on the rainfall for their supply; were it otherwise, the rich alluvial soil around would yield a grateful return to the agricultural labours of the inhabitants. The prices of food here

during our stay, were, for one dollar—3½ kelas wheat, 4 kelas jowaree, 4 kelas bajree, 10 rutl or pounds ghee, 16 rutl or pounds coffee, 10 fowls. The rutl here is smaller than that of Aden, being 13 dollars' weight, the latter being 16. The kela is a measure equal to three pailies of four seers. Salt is obtained from Nisab and Hazra, where there are mines of it. The kafilas to Nisab and Mareb, pursuing the same route as of old, when the Arabs were the medium of Eastern and Western commercial intercourse, take on tobacco, cotton, and cloth, and bring in return coffee, salt, &c. The present Cazee of the town is a young man; his father, the late Cazee, was a man of noted sanctity and learning, and of great consideration in the country. There are six mosques, the only whitewashed buildings in the place. The Khutba is read for Sultan Ahmed. There are about half a dozen reputed Fakihs, who subsist on alms, and perhaps by teaching a few boys to write; but there are no schools.

The Sultan is not a man of wealth, and consequently has not much influence. His house is almost entirely unfurnished, and he possesses but one slave, the little revenue he receives being nearly all expended in subsidizing the Bedouins, whom he is obliged to conciliate. The next tribe—the Owlaki—consists of two great divisions, each ruled over by an independent Sultan. The upper tribe, or Owlaki-el-Alian occupies the interior, and is at present under the rule of Sultan Awad Abdulla, whose residence is at Nisab, a large town situated in an immense plain. This tribe or branch is composed of two distinct families, the Beni Maan and Mahajir; the former, an offshoot of the large tribe of that name, is more immediately under Sheikh Fereed bin Rowees of Yeshbum, and is composed of 18 clans. This is the superior and more important family. The Mahajir occupies Nisab and the surrounding country under Sultan Awad: in it there are 23 clans, and it is a numerous family, having, it is said, about 100 villages.

The Owlaki is a warlike but not a predatory tribe. I am unable to hazard a guess at the number of the population; many of them are in the service of the Nizam of Hyderabad, and enjoy there considerable influence and wealth. The lower tribe, called the Awalik Ali Nasir, or the Owalik Ba Kāzim, are subject to Sultan Bu Bukr Abdulla at Howr, and hold the extent of coast between the Fudhlis and Deaybees. This branch may number about 15,000 souls, and is divided into, or rather consists of, two distinct parts, the Gümmūsh and the Ba

Kāzim; the latter has many sub-tribes, of which the principal are the Shimai, Jar-elee, Hutli, Munsooree, Hakee, Marebee, and Hul Ba Jerādee. Of all these, the first one, Shimai, takes the lead, on account of the supposed superior intelligence and sagacity of its members. They are always the first consulted in matters of importance, and their opinion is held in much respect by the others; their protection, too, is necessary to strangers passing through the Ba Kāzim territory. The Shimai clan occupy the plain and district of Mongaa.

The next in importance is the Jarelee, who, being the most numerous, form the army, and are the chief strength of the tribe. The Gūmmūsh are a peculiar race, and though among the Owalik, not of them. They assert themselves to be descendants of the ancient Himyarites, and inhabit the valleys bordering on the Deaybees, with whom they claim kinship; their head-quarters are at Khubr. They are a brave people, and feared by their neighbours, to whom they seem superior.

A large extent of the Owlaki country is under cultivation, and they have numerous flocks of sheep and goats and herds of camels in their extensive pastures; they possess also a fine breed of horses—the only tribe in these parts that has any. The extent of coast line held by them is about 60 miles. The Sultan, Bu Bukr, succeeded his cousin Manassir some seven or eight years ago, when the latter, with his son Abdulla, was treacherously murdered by one Ali Abdulla. At the time of our visit Bu Bukr was in difficulties with his subjects in consequence of four men having been killed in anger, and unjustly, by his brother. The occurrence had taken place a short time previous; and the tribe were highly indignant, saying it was a departure from the customs of their fathers, and the same thing might happen again, to their dishonour, unless they asserted their rights at once. The Sultan was about to propose some reparation to the relatives, but, if not acceded to, a meeting of Syuds or a conference of the whole tribe would have to be convened for the discussion and final adjustment of the affair.

The custom of subjecting accused persons to trial by ordeal—Bashāa—as a test of guilt is still in use among this and neighbouring tribes, but is not much resorted to, unless for serious crimes. There are numerous methods, but the more usual one is the application of a heated knife to the tongue.

The Fudhlis are a daring and spirited tribe, holding the sea-coast and the range of hills from Mujatein to Imaad, a distance of nearly 100 miles, having extended their former limits by dispossessing the Yaffaies of Abien some thirty years ago. For many years after the occupation of Aden they caused an immense deal of annoyance under a troublesome old Chief, Sultan Ahmed, by plundering the kafilas on the road, and so preventing supplies from being brought into Aden; but since their late chastisement they have settled down into peaceful and orderly neighbours, and under Sultan Haidera, who has now succeeded his father, are rapidly increasing in wealth and prosperity, and are now among our best friends.

The Fudhli tribe is very numerously subdivided, and may be considered in three sections—the Merkashi, the Ellah Bedouins, and the clan occupying Abien and the low ground: these are the Nakhai, Masaadee, Saeedee, Ahl Saeed, Ahl Shedad, and Ahl Haidera Munsoor. Some of them, however, are merely nominal, and only contain a few families. They may number 5,000 people.

The Ellah Bedouins comprise nine clans, viz. the Elahi, Hasein, Jaadnee, Maisree, Arooli, Fatahanee, Hatamee, Hanashee, and Ahl Sheneen. They are by far the most numerous section, amounting perhaps to 9,000, and inhabit the hilly portion of the territory and Dathina, which is a dependency of the Fudhlis but pays tribute to the Sultan of Nisab. The Merakash, like the Gümmüsh and Deaybees, are of Himyar descent, and are identical with them in customs and character; they hold the eastern part adjoining the Owlaki. The loose morality of their women is notorious, though considerable laxity exists among all the tribes in these parts, the sale of wives even being a practice not entirely unknown to them. The Merakash number about 3,000 individuals, making the total strength of the tribe about 16,000 or 17,000 souls. Many of the clans of these tribes, it will be observed, derive their names from women. This is a common practice, and it is not unusual for men, too, to take the mother's name, instead of the father's, as a surname—for instance, Abdulla bin Fatima.

The country produces no coffee, but the hills abound with myrrh trees, the gum of which is gathered by Somalees; and in the low alluvial plain of Abien the Fudhlis possess one of the most fertile districts in S. Yemen, which would be very productive if properly irrigated.

The soil is a sandy loam. It is watered by two Wadies, the Hassan and the Bunna, both branches of one source, rising in the hills to the north-west; they were both flowing when we passed, the Bunna being about 400 yards broad and running over knee-deep.

The sea is bordered by a thick forest of acacias, and beyond, toward the hills, are broad fields of grass and corn stretching away to the Yaffai valley. The uncultivated parts are either sandy patches, or are covered with brushwood and thick jungle. The jowaree grows to a great height, considerably overtopping the head of a man on a camel.

The name Abien is commonly applied to the whole extent of country held by the Fudhlis, but they themselves, and it appears correctly, understand by it only the strip of plain lying between the Yaffai hills and the sea, and containing perhaps 200 square miles. It produces jowaree, bajree, wheat, barley, sesamum, and cotton.

The land is all owned by the Sultan, and there are no freehold proprietors; the tenant generally has to pay half the proceeds to the Sultan.

In the neighbouring country of Lahej the land is in the hands of private holders, but it is being gradually bought up by the Sultan. Ambergris is sometimes found on this coast; it is highly prized, and is a monopoly of the Sultan. I believe there are no manufactures carried on among this tribe. The chief towns are Sureea, Shugra, Assala, Khor, Jowala, Khamila, Teran, and Amodea. Sureea is a small town securely situated in a ravine of Jebel Arees, which rises about 3,000 feet behind; its elevation is 700 feet above the sea, from which it lies distant five miles; the ground between is stony and furrowed by nullahs. Near the town is Dar-el-Harz, a quaint old grey tower, the chief stronghold of the Fudhli Sultans.

Mr. Munzinger's Report.

1.

Object.

I would not have ventured on a geographical outline of the triangle between Ain, Habban, and Howr if Arabia were as well known as it is interesting; but

so little real information is to be found in the travellers that any new addition cannot but be welcome.

I am well aware that all I am going to say will only prove our shortcomings; but I hope that the knowledge of all we could not look after will induce other better men to go in for it. We were allowed to travel through the country and to see as much of it as would a traveller by railway; all we got was a general impression, and that I am going to give a sketchy account of.

2.

Geographical division in two regions:—
I. Sand and lime region.
II. Metamorphic region.

In the triangle lying in our track and the country round it two distinct geological, and so geographical, regions presented themselves to us, which I may begin to call, from their principal rocks, the sand and lime region (I.), and the metamorphic region (II.) When we will have explained this denomination, everything in the country—vegetation, animal and human life—will be found to be determined by it.

The sand and lime region has its west frontier near Habban, and runs in a S.E. direction; the metamorphic region leans against it from W., and extends S.E. and S.W., its waters falling principally northwards. I am not certain about the Diabi or Himyar Hills, they look from the N. side like sand and limestone; but fragments in the watercourses, and the knowledge that they are woody, make me believe that their principal character is metamorphic, girded only by the high hill-range over Maifa.

3.

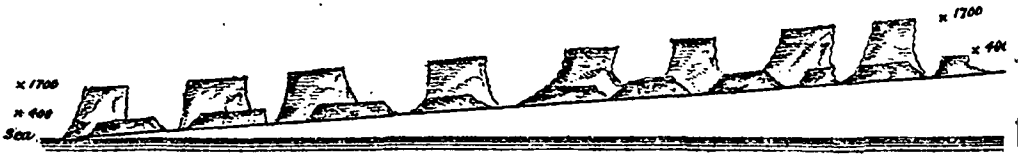
Geographical and geological appearance of the two regions.

The geographical and geological appearance of the two regions is very distinct.

I. Sand and lime region.
II. The hills.

The sand and lime region presents a rising plane, nearly filled up with a double range of hills, the former consisting of inaccessible blocks or ambas, 1,500 to 2,000 feet high, and the latter of 300 to 500 feet high hillocks, more torn up and accessible. The plain itself has a slope of 1 : 80 (on

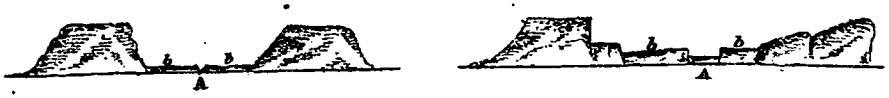
the line from Ayn to Habban). The whole region would present the following aspect, minor irregularities not accounted for :—



These hills have nearly all the same elevation above their oblique base; they cover nearly eight-tenths of all the space, without forming a great continual ridge or mountainous country. They have, so far only of course, some analogy with the E. Jura.

But as these hills, by their rocky character and their inaccessibility, exclude any idea of vegetation or animal life, they influence the country only by their sending water, sand, and lime down to the plain, and disturbing its surface by it. There is, then, only left for consideration the rising plane, which is represented by large watercourses or "Nullas," with alluvial stripes along its banks, narrowed by the lower, and sometimes even by the higher hill-range.

2. The plane ("Nullas").



a. *Wad* (*Nulla*). b. *Alluvium*.

The rock we observed in this region was sandstone, lime, clay, and conglomerate. We brought back some specimens: the strata are nearly horizontal: the rock is in a state of speedy and ever-active decomposition, which lends the hills very extraordinary tower-like forms. The water working on the barren, friable sandstone carries away piece after piece; it has much less power on the lower hills, which consist of conglomerate and strong red and yellow clay.

4. Decay of the hills.

Note No. I.—It may not be useless to consider the consequences of the decomposition. The lime and sand hills, worn out, break down; the sand produced by the fragments forms at their base an oblique

plane, carried away by wind and water, and forming the "downs" or "kaud" we found between Ayn and Maifa. On the north declivity of the sand and lime region it is carried down to the sand sea, or Bahr-el-safi. This decay seems not to influence much the features of the alluvial soil and of the Wad, these being protected by the stronger lower hill-range; and in fact the ruins of Nageb-el-Hajer, which are certainly 1,500 years old, show by their situation that since then no great change has come over the country.

Another question would present itself here, viz. have the sand and lime hills formed of old one big stock of rock, washed out in a very long period? The corresponding heights of the hills would contend for it, but we know not enough to answer this interesting problem.

4

II. Metamorphic region.
1. Its general character.

The metamorphic region presents a quite different aspect and character; it consists of a disorderly agglomeration of hills, all connected together, and forms a mountainous country (not plateau), seldom interrupted by disconnected plains and narrow "Nullas." The form of the hills is round or conical, with rather soft lines, allowing trees and grass to grow, and favouring animal life.

2. Its sort.

The rock is gneiss, slate, quartz; it shows often extraordinary pressure by its curved strata, as —

The stratification is rarely horizontal, but generally in great angles and lying pell-mell.

3. Pressure of sand and lime hills in it.

A curious feature of this region is that now and then isolated sand and lime hills, easy to be known far off, look out of the metamorphic hill-land like islands out of the sea, quite a protest against metamorphosis.

The metamorphic region would present the following aspect: —

Metamorphic Hills.

5.

The water-courses.

Let us now examine the relation of the water-courses to the surface, as we found it until now.

The map shows that from the metamorphic or Owlaki stock all the "Nullas" (Wadis) of this country rise; from it also comes all the alluvial soil fertilizing the sand and lime region. We find as principal Nullas—

1. Wadi Maifa, direction S.E.
2. Wadi Howr, direction S.W.
3. Wadi Nicab, direction N.E.

As far as we know, all three rise close out of the same stock.

We hear that the principal waters of Dethina go in a S.W. direction to Abyen (Fudhli land), and it is very probable that the district of Dethina is only a dependence or lower range of the Owlaki stock.

All these Nullas have in an inverse sense (north exchanged against south) some analogy with their most noble brethren of Central Europe; the Alps corresponding to the Owlaki Alps, the Wahedi lime and sand hills to the Jura, the German lowland to the Gulf of Aden, and the N. sand sea to the Mediterranean. We would compare the W. Maifa to the Aar, W. Howr to the Inn, W. Nicab to the Rhone.

Character of them.

We have not much to say about the character of these watercourses, or "Nullas" (to adopt the Indian word). In the sand and lime region they are large and smooth, carrying sand and alluvial soil with a slow fall, and digging out their bed through the sandhills. In the metamorphic region ravines or crevices were evidently formed the best metamorphosis, filled up and levelled by the water carrying sand and boulders; it profits of the

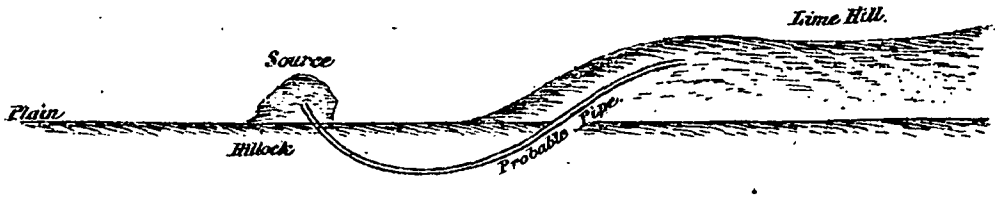
ways plutorial action has broken through. The Nullas are in consequence rather narrow, have much winding, and work little on their solid slaty banks.

About water generally.

Water in both regions lies generally 50′ to 100′ under the sand bed, but it is found in large quantity; running water is only found where overlying rocks or cataracts force it up to the surface.

Water in the sand and lime region is generally bad and has a magnesia taste about it; in the metamorphic region it is rather brackish, quite analogous to the waters in the Soho and Habab torrents.

An extraordinary exception to these general rules are the, so to say, artesian sources of Ayn and Sohail, &c., where out of a sandy plain lying near limestone hills rise very small 50 feet high hillocks without any level sources.



As these hillocks are too small to explain the presence of a strong source, we can only suppose that it comes from the neighbouring hills by means of natural pipes.

6.

About the country out of our triangle by induction and information.

It will be now time to make some observations about the country out of our track round the triangle we went over, profiting of native intelligence, and of induction from the seen to the unseen. But I give the results with much reluctance, because experience shows that natives may give distances and names, but have no geographical instinct; a proof of it is Colonel Chesney's Map of Arabia.

Country N. of the Owlaki Hills.

We heard, then, that N. of Owlaki stock large fertile plains extend, the waters running N.E., and Nicab being the centre.

Country N. of Wadi Doan sand sea.

We heard further, and Wrede's account corroborates the statement, that N. of Wadi Doan lies the famous Bahr-el-Safi, or sand sea, *i.e.* a very low basin filled up with loose sand.

By induction, from our own experience, these statements merit full belief, and we would try to explain them in the following way :—

How to be explained.

We suppose N. of all this country a basin, or large crevice, extending from long Nicab, about very far E. having a great depth, sea level or more. This basin has been filled up on the W. side by alluvium from the metamorphic rock, creating the large Nicab plains, whilst N. and N.E. of Habban and Wadi Doan, which belong all to the same sand and lime region, the decay of the rocks on the N. declivity filled the E. side of the basin with sand only. I suppose the Nicab alluvial plains and the sand sea to be connected—the latter receiving the water of the former—and a continual fight to go on between the vivifying influence of alluvial sand from the Owlaki stock and the overbearing inlet of dead loose sand from the Wahedi Ambas.

If I have hazarded myself in such hypothesis, I have done it only to excite more research. A journey from Aden to Mareb, and thence to Mekalla, would settle all S. Arabian watersheds.

7.

What appearance this country ought to have in a map.

From what we have said already it is evident that the general appearance of all this country is exceedingly dry. If we took the best time of the year—*i. e.* when all country is under cultivation, in September or October, which would be only fair—a map ought to be coloured in the following manner to give a true idea of what the country is :—

(1.) The "Wadis" or "Nullas" all in yellow (the water being subterranean) with the exception of short blue threads, as Redê-ha and down the Monga torrent.

(2.) The sand and lime hills grey or yellow, being destitute of all vegetation in *any* season.

(3.) Over the "Nullas" some green spots, indicating the alluvial oases being under cultivation; as part of Maifa, Hauta, river down it, Lehe, Habban, Khabr, Monga, &c.

(4) Owlaki Hills in clear green, enjoying some vegetation.

I may mention, by the way, that it is a great mistake of our map-makers to colour African and Arabian "Nullas" in blue, as if they were rivers full of water; running waters occur, but are never low.

8

Comparison to Abyssinia.

The general appearance of the country I am describing is in many ways very similar to that of different parts of Abyssinia, and I looked of course anxiously out for possible analogies, but I found no real uniform identity.

The sand and lime hills of the Wahedi look very like the little ambas near Debra Dammoo and generally of Tigré—the same table-land with perpendicular walls, the same speedy decay. But in Abyssinia the table-lands are connected between themselves; they are accessible and large enough to keep water and vegetation, and to constitute so the real wealth of the country; the valleys also between them are much larger and more fertile: in short, the Arab table-hills are quite a miniature of Abyssinia in every respect.

The Owlaki hill-land has some likeness to parts of Habab and Shoho country in rock, trees, and appearance; the Howr torrent is a photograph of the Hibka or Haddas.

The Arabian coast is certainly much superior to the African, or, rather, Abyssinian coast, by the simple reason that great part of the highland slopes down to it and sends to it its waters, forming large alluvial plains with important settlements; as Howr, Abyen, Lahej, &c. Its climate is also rendered much cooler by the open sea-breeze.

The African coast receives also some large "Nullas," but some of them have no remote rise; others are lost in the salt plains; the rest have, thanks to the light soil, too high banks to be available for irrigation. The advantage is to all for the Arab coast.

9

Effects of the geographical condition of the country on nature and man.

From the geographical condition of the country, as we have found it, it will be quite easy now to infer the necessary effects it must have on nature and man.

We have already observed that in the sand and lime region the hills can absolutely bear no tree, no grass, no animal; only the "Wadis" are approachable to life, and even then vegetation is only possible when there is a little room left between hill and torrent to be covered by alluvium.

1. In the sand and lime region.

On these rare spots is concentrated human industry. Where we see vegetation, it is produced by culture: there is, of course, a general absence of cattle.

The settlements then occupy the narrow alluvial strips over the "Wadis," out of which man strives to get his livelihood by careful tillage and manuring, and by watering from torrent and well: hence the large but dense colonies of Maifa, Hauta, Habban, &c., oases in a true desert.

The condition of the metamorphic region is quite different,—its accessible, connected, undulated, clayish ground favours vegetation and animal life. We find in consequence more grass, many trees, wild animals; but I must confess that even here vegetation bears no comparison to similar countries in Africa. Nature is exceedingly sober, but very grateful to stirring-up labour; a lucky circumstance, I think, preventing the Arabs from sinking in the indolence of the Abyssinians.

2. In the metamorphic region.

A further necessary consequence of this condition is, that this metamorphic region is not destitute of cattle (camels and goats, no cows, there being more trees than grass). Some fixed settlements are to be found in the rare plains, but the greater part of the inhabitants live with and on their cattle. I suppose the population of this region to be less than that of the sand and lime region; but it is better distributed, there is more life all over, much wilderness and wildness in land and man, but no death.

10

Political and economical life is necessarily also fixed by the same natural influences. We find land, independent settlements in one region with husbandry only; smaller but tribe-like ones of cattle-breeders, and less cultured, in the other.

Effects of nature on political and economical life.

We find no nomads: the character of the country, being void of large grassy or woody plains, forbids it. We find general poverty, but equality of fortune; and so of power. Scarcity of room forces man to utilize every inch of it, to ameliorate it, and to increase his income by industry; he is even obliged to spare room to build very high houses. The friable rock being bad material leads to the employment of bricks, for which there is abundant first-rate clay. The absence of wood and iron forbids the arts of carpenter and smith. We find no "meubles." Even in the Sultan's house people sleep on the ground.

The products of the country are the same as in Abyssinia at equal elevation, plus dates (all kinds of jowari, barley, wheat, thif, &c.). The coffee plantations occur more to the east on the great chain running parallel to the Red Sea; but I don't know why it could not be grown here, too, if they watered it as they watered common grain. The same observation applies, *à plus forte* reason, to cotton. Indigo is grown, but not to a great extent. In the metamorphic region we saw plenty of myrrh trees; frankincense, we heard, occurs in the Himyar Hills, but it is scarcely known by the Arabs.

The great disproportion between cultivable soil and dead sandstone will never permit a great increase of population; and I suppose that in old times things have not been much better, the only large ruins we found being those of Maifa. However, I believe that the Government of those days, as it had more authority, did more to keep the torrents within the dams.

Trade is necessarily restrained to strict necessity; its routes, the torrents of Maifa and Howr, are indicated by nature.

I may conclude this chapter by observing that the geographical and political boundaries coincide; the Wahedis hold the sand and lime region; the Owlaki the metamorphic hill-land and its northern slope. The old Himyarites (the Deaybi, Gúmmúsh, &c.) live where the two regions join, and, meeting together, form a large hill-barrier against the sea. It is curious to find these aborigines driven away from the cultivable ground, where we learn that they enjoy even now more rational spirit and unity than the Arabs. An exact study of these tribes would be most grateful to the ethnographer.

11

Aden and Arabia.

It is now thirty years that Aden is the Gibraltar of Arabia, and I am sorry to say that the first pioneers coming to reconnoitre all over—poor Haines, Cruttenden, Wellsted, of whom we could not speak with too much respect—knew better about Arabia than the British officer knows to-day.

There is no doubt that Government policy, looking at Aden as a purely military place and coal depôt, and not as an emporium, made it desirable to have as little as possible to do with the interior.

But as neighbours are always neighbours, even were a channel or an isthmus dividing them, practice has not strictly followed theory. Want of provisions, and even of water, forced the different Residents to provide for the safety of supply convoys. But as Government, from dread of conquest, wished not to enforce this point, they made the so-styled Sultans round Aden their pensioners, with the duty of keeping the roads open.

It is not here the place to inquire how this system works and succeeds; at all events, I have no doubt that it has not a nice moral effect on the Arabs, for whom meek ways are always weak ways. A little fighting, I believe, would, after all, have been cheaper and more honourable; proof thereof is Sir W. Merewether's expedition against the Fudhlis, which did more for lasting friendship and peace than all the rupees thrown away these thirty years.

Necessarily, the same cautiousness made it undesirable that British officers went inland; they might be captured or even killed, and then Government could not say, I care not.

The consequence is that the country 50 miles round Aden is nearly a *terra incognita;* that 100 miles off even on the coast an Englishman is looked upon with a most comical surprise, as if he came from Kamschatka or were a new species; that he is not very safe, and obliged to buy his way through; that at Habban nobody knows anything about Aden except the wealth and liberality of its treasure. All this is as true for Somali-land and all the country round the Gulf, of which Aden seems to be the mistress.

I am far from condemning cautiousness, but respectability goes above it. Besides, I cannot help thinking that even the most cautious Govern-

ment ought to know more about its neighbours; the *imprévu* plays a great part in history, and may bring on one day an Arab Expedition. Knowledge, in fine, is never lost. On the other side, a Government who makes treaties with natives ought to know, at least, where and who they are. I think, too, to conclude, that when the Aden Residency spends lacs on forts which are not always *très réussi*, it could well spend some little money on the exploration of Arabia and Somaliland.

There would be a way to combine sanitary, military, political, and geographical views, and to satisfy them all. The summer months in Aden are dreadful: we know not what is worse, heat or dust. Let them march every year half the garrison out for three months, and make a promenade in the hills, with no other object than to get in a cool country and give exercise to the soldiers, paying for everything, demanding nothing but full respect. Once to Taez, once to the coffee-hills of Yaffe, another year to Nisab, and so on. The troops would enjoy it exceedingly; the expense would not be immoderate; and need not tell what impression such a peaceful but powerful march through this virgin soil would produce on the simple but logical children of Ishmael and Hazramawit!

ART. VIII.—*Memorandum on the Tribal Divisions in the Principality of 'Omân, with a Map showing the general Distribution of the Tribes, and a Table showing the Genealogy of the Ruling Dynasty of Muscat, by* Lieut.-Colonel E. C. Ross, Political Agent at Muscat.—*Contributed by Government.*

The classification of the Arabian tribes or clans inhabiting 'Omân into two great divisions, "Hinâwî" and "Ghâfirî," is peculiar to that kingdom, and has been adopted in comparatively recent times. The modern history of 'Omân being mainly the narrative of the contentions between these great rival factions, a precise understanding of their mutual relations and the origin of their differences is desirable.

With a view to a clear explanation of these points it is necessary to refer back to the older and better-known tribal classifications.

Arabian historians have divided all the tribes of Arabia into three primary classes:—

1*st*—El 'Arab el 'Arabeh, *i.e.* pure Arabs, those created speaking Arabic.

2*nd*—El 'Arab el 'Mota'arribeh, or genuine Arabs, those who acquired the Arabic language,

3*rd*—El 'Arab el Mosta'arribeh, or the naturalized Arabs.

Of these three classes the first is considered to be lost or extinct, and there remain the classes known to Europeans as genuine Arabs and naturalized Arabs.

The former consists of those descendants of Kahtân (or Joktan of Scripture), many of whom settled in Yemen, and they are also termed Kahtânite or Yemenite Arabs.

The naturalized Arabs are said to be descended from Ishmael, but do not trace pedigree further back than 'Adnan.

This class is termed Ishmaelite, 'Adnanite, or Ma'addite, and also Nizârite, from Nizâr bin Ma'add.

The first Arab settlers in 'Omân came from Yemen, and were Kahtânite. Later immigrants arrived from the westward, and were mostly tribes of the Ishmaelite branch.

The terms, however, by which these rival branches were distinguished in 'Omân were "Yemenîyeh" and "Nizârîyeh"; and these terms continued to be employed up to the beginning of the 18th century.

At that epoch civil wars occurred between the Yemenîyeh and Nizârîyeh, in which the tribe Beni Hinâh, under their leader Khalf bin Mubârik, on the one side, and the tribe Beni Ghâfir, under Mahommed bin Nâsir, on the other, took prominent part. Owing to the ability and reputation of these leaders, it happened that the Yemen tribes ranged themselves under Khalf the Hinâwî, and the Nizârîyeh under Mahommed the Ghâfirî.

This circumstance led to the adoption of the terms "Hinâwî" and "Ghâfirî" in their present extended sense, in supersession of the older and more correct nomenclature.

The term Hinâwî, therefore, as now applied, may be said to correspond with Yemenîyeh or Kahtânite, and Ghâfirî with Nizârîyeh, Ma'addic, or Ishmaelite, with this modification, however, that, since the period of the adoption of the present party-names, certain tribes have, from political causes, changed their denomination, Hinâwîs becoming Ghâfirîs, and *vice versâ*.

From the supersession of the old system of classification it has resulted—firstly, that the tribes are ranged in political parties; and secondly, that the original genetical lines of demarcation are in course of being effaced.

It would undoubtedly be possible still to classify the various clans according to the older systems, but for practical official purposes the division into "Hinâwî" and "Ghâfirî" must be adhered to.

There can be no doubt that this is an instance where the assumption of a name or party-cry has to a considerable extent influenced the course of historical events.

At the present time a prince of a Yemen house is supported in power by the descendants of the settlers from Nejd.

A reference to the table of tribes will show that the majority of the Hinâwîs follow the Ibâdhi sect, whilst the opposite faction are mostly orthodox.

This religious distinction was in older times more general and marked, but it is one which has powerfully affected the political condition and government of 'Omân.

In some provinces the tribes of either division have usually recognized one Chief as the head of the faction generally, and the person so recognized is termed Temîmet.

For instance, in the province of Dhâhireh the Chief of the Beni Ghâfir is styled Temîmet-el-Ghâfiriyeh, and looked upon as a sort of referee in matters affecting the general interests of the Ghâfiris.

The Hinâwis of 'Omân have been usually accustomed to respect the reigning Seyyid of the Al-bû-Sa'eed as their Temâmet.

The above remarks are intended to supplement a table which has been prepared of the principal tribes; perhaps they may also help to elucidate the somewhat complicated question of the growth and mutual relations of the rival parties in the state of 'Omân.

PRINCIPAL TRIBES

Hinâwî

Names of Tribes. Adjective Form.	Names of Tribes. Collective Plural Form.	Religious Sect.	Province.
Adîyî	Beni-'Adî	Ibâḍhî	El-Hajar
'Alawî	Beni-'Alî	,,	Ḍhâhireh
'Alawî	Beni-'Alî	,,	Bâṭineh
'Âmerî	El-'Awâmer	,,	'Omân
'Arâbî	Beni-'Arâbeh	,,	'Omân
Bârihî	El-Bawârih	Sunnî	Bâṭineh
Baṭṭâshî	Beni-Baṭṭâsh	Ibâḍhî	'Omân
Bedû-î	El-Bedû-ât	Sunnî	El-Hajar
Bereykî	Yâl-Bereyk	Sunnî & Ibâḍhî.	Baṭineh
Dahmanî	Ed-Dahâmineh	Sunnî	El-Hajar
Ḍhâhirî	Edh-Ḍhowâhir	,,	Ḍhâhireh
Fezârî	El-Fezâreh	,,	Bâṭineh
Ghâfilî	El-Ghâfeylât	Ibâḍhî	Bâṭineh
Ghâribî	El-Ghawârib	,,	Bâṭineh
Ḥabsî	El-Ḥabûs	,,	Sharḳîyeh
Ḥamadî	Yâl-Ḥamad	,,	Bâṭineh
Ḥâjerî	El-Ḥawâjer	,,	Sharḳîyeh
Ḥammâdî	Beni-Ḥammâd	Sunnî	Bâṭineh
Ḥâdî	El-Ḥâdî-în	Ibâḍhî	Sharḳîyeh
Ḥârithî	El-Ḥarth	,,	Sharḳîyeh
Ḥaṣanî	Beni-bû-Ḥaṣan	,,	Sharḳîyeh
Ḥaṣanî	Beni Ḥaṣan	,,	El-ḥajar
Ḥeddâbî	El-Ḥeddâdebeh	,,	'Omân
Do.	Do.	,,	Bâṭineh
Ḥejerî	El-Ḥejrî-în	,,	Sharḳîyeh
Ḥeydî	El-Ḥûyûd	,,	Bâṭineh
Ḥimá-î	Beni-Ḥimâh	,,	'Omân
Ḥindasî	El-Ḥimâdis	,,	Bâṭineh
Howsanî	El-Howâsineh	,,	Bâṭineh
Jahḍhamî	El-Jahâḍhim	,,	Sharḳîyeh
Jerrâdî	Yâl-Jerrâd	,,	Bâṭineh

OF 'OMAN.

Division.

Villages or Districts.	Number of Males.	Remarks.
Rostâḳ. Howḳein	200	
Yaṇḳal	1,000	At feud with Beni-Ghâfir.
Wâdî 'Âhin	500	
El-Falaj. El-Karyatein. Hameydhein. El-Kal'ah.	2,000	At feud with the Jenebeh.
Es-Sâbal	1,000	At feud with the Siâbi-în.
El-'Otheybeh	300	
El-Mazâra'	2,000	At feud with the Siâbi-în.
Wâdî-Hattâ	250	
Shirs. Kaṣbîyet-yâl-Bereyk. Ed-Deyl.	220	
Wâdî-el-Kowr	200	Ishmaelite.
El-'Ein. El-Mo'teridh	1,000	At feud with the Na'îm.
Makheylif	70	
Bû-'Abâlî	50	
Bû-'Abâlî	50	
El-Madheybi. Er-Rowdhah. Wâdî-'Andâm.	5,000	
El-Gharîfeh	200	
Ṣûr. Jenâh	500	
Ṣûr-Hîyân	500	
Wâdî-'Andâm	500	
El-Kâbil. Ed-Derîz. Ibrâ	2,000	At feud with the Mesâkereh.
Ja'lân	2,000	At feud with the Beni-bû-'Ali.
Rû-î, Wâdî-bûsher. El-Habûbîah.	1,500	
El-Khowdh. Fanjah. Bidbid.	1,000	At feud with the Siâbi-în.
Shirs	150	
El-Bidîyeh	3,000	
Dhîyân	300	
Beled-Seyt. Wâdî-'Alâ. El-Khowdh. Fanjah. Bidbid.	3,000	The term Hinâwî, now applied to the whole Division, derived from this family. They have a feud with the 'Ibri-în.
El-Ghalîl	400	
Wâdî-el-Howâsineh. El-gheyzein. El-Khâbûrch.	2,400	At feud with the Beni 'Omar.
Semed	300	
Abû-Mahhar. Marâghah. El-Jerîd.	500	

Hinâwî

Names of Tribes. Adjective Form.	Names of Tribes. Collective Plural Form.	Religious Sect.	Province.
Kareynî	Yâl-bû-Kareyn	Ibâḍhî	Bâṭineh
Kareyṭibî	El-Karâṭîb	Sunnî	Bâṭineh
Kaṭeyṭî	El-Kaṭeyṭ	,,	Bâṭineh
Khâlidî	Beni-Khâlid	,,	Bâṭineh
Khamîsî	Yâl-Khamîs	Ibâḍhî	Bâṭineh
Majeynî	El-Majânîyeh	Sunnî	Bâṭineh
Mâlkhî	El-Mawâlikh	,,	Sharḳîyeh
Manderî	El-Manâdereh	Ibâḍhî	El-Hajar
Manwarî	El-Manâwareh	,,	Bâṭineh
Marzûkî	El-Marâẓîk	Sunnî	Bâṭineh
Masheyfirî	El-Mashâfîreh	Ibâḍhî	Bâṭineh
Mashrafî	El-Mashârifeh	,,	Sharḳîyeh
Ma'walî	El-Ma'âwal	,,	Bâṭineh
Nowfilî	En-Nowâfil	,,	Bâṭineh
Rasheydî	Yâl-bû-Rasheyd	,,	Bâṭineh
Reddeynî	Er-Reddînât	Sunnî	Bâṭineh
Rûeyhî	Beni-Rûâheh	Ibâḍhî	'Omân
Sa'adî	Yâl-Sa'ad	,,	Bâṭineh
Sa'îdî	Âl-bû-Sa'îd	,,	Sharḳîyeh
Do.	Do.	,,	'Omân
Do.	Do.	,,	Bâṭineh
Sâlehî	Es-Sawâleḥ	,,	Bâṭineh
Selâmî	Al-Abd-es-Selâm	Sunnî	Bâṭineh
Serîrî	Es-Serîri-în	Ibâḍhî	El-Hajar
Ṣowwâfî	Eṣ-Ṣûâwafeh	,,	Ḍhâhireh
Shemsî	Esh-Shemûs	Sunnî	Bâṭineh
Shîâdî	Esh-Shîâdi-în	,,	Bâṭineh
Wahîbî	Âl-Wahîbeh	Ibâḍhî	Sharḳîyeh
Do.	Do.	,,	Bâṭineh
Wahîbî	Beni-Wahîb	,,	El-Hajar

—continued.

Villages or Districts.	Number of Males.	Remarks.
El-Hajeyreh. Dhiyan	800	
Khor-el-Milh	40	
El-Bereyk	150	
Umm-et-Teyfeh	400	
El-Khabbeh: Sha'ibeh	1,000	
Wadâm	200	
Râs-el-Hadd	800	
Es-Seleyf	50	Ishmaelite. At feud with the Sûâwafah.
El-Hadhîb	300	
Ṣûr-Hîyân. Khor-el-Hamâm.	600	Ishmaelite.
El-Manfash	1,500	
Er-Rafsah	300	
El-Khabbeh. Wâdî-el-Ma'âwal.	3,000	At feud with people of Nakhl.
Sha'ibeh. Wadâm. Majiz-en-Mowâfil.	450	
El-Khadhreh	1,000	
El 'Abbâseh	50	
Wâdî-beni-Rûâheh	2,500	Ishmaelite. At feud with the Beni-Jâber and Beni-Rîyâm.
Bû-'Abâlî. El-Mallâleh. El-Kart. Tharmad. Bat-hâ. Er-Rakkâs. El-Khadhreh	10,000	
Semed	300	Family of the reigning Seyyids. Derive from the Azd.
Mahyûl. Falaj. Abû-Nakhîleh. 'Azz. Nanh. Âdam. Nezwâ.	3,500	Do. do. do.
Kasbîyet-âl-bû-Sa'îd	200	Do. do. do.
El-Suweyk	400	
Ed-Deyl	50	
Nakhl	100	
Es-Seleyf	50	Ishmaelite. At feud with the Manâdereh.
Khor-el-Hamâm	100	
Ṣûr-esh-Shîâdî-în	70	
El-Jâzer. Sedeyreh. Senow. Wâdî 'Andâm	5,000	Bedouins.
Majiz-âl-Wahîbeh	70	
Rû-i. Wâdî-Bûsher. El-Habûbîah.	1,500	

Hinâwi

Names of Tribes. Adjective Form.	Names of Tribes. Collective Plural Form.	Religious Sect.	Province.
Werdî	El-Werûd	Ibâḍhî	Sharḳîyeh
Washâhî	El-Wahashât	Sunnî	El-Ḥajar
Yemenî	El-Yemen	Ibâḍhî	'Omân
Za'âbî	Ez-Zû'âb	Sunnî	Bâṭineh
Zekawî	Ez-Zekâwineh	Abâḍhî	Sharḳîyeh

Ghâfirî

'Alawî	Beni-bû-'Alî	Waḥḥâbî	Sharḳîyeh
Bidâî	El-Bidâ	Sunnî	Ḍhâhireh
Der'î	Ed-Derû'	Ibâḍhî	'Omân
Do.	Do.	Sunnî	Ḍhâhireh
Ghâfirî	Beni-Ghâfir	Sunnî & Ibâḍhî	Ḍhâhireh
Do.	Do.	Ibâḍhî	El-Ḥajar
Harrâsî	Beni-Harrâṣ	„	El-Ḥajar
Hâshimî	El-Hishm	Sunnî & Ibâḍhî	Sharḳîyeh
Hikmânî	El-Hikmân	Sunnî	Sharḳîyeh
'Ibrî	El-'Ibrî-în	Ibâḍhî	'Omân
Do.	Do.	Sunnî	Ḍhâhireh
'Isâ-î	Beni 'Isâ	Ibâḍhî	El-Ḥajar
Jâberî	Beni-Jâber	„	Sharḳîyeh
Do.	Do.	„	El-Ḥajar
Jeneybî	El-Jenebeh	Sunnî	Sharḳîyeh
Do.	Do.	„	'Omân
Do.	Do.	„	Bâṭineh
Ka'bî	Beni-Ka'b	„	El-Jow
Do.	Do.	„	El-Ḥajar
Kundî	El-Kunûd	Ibâḍhî	'Omân
Kateybî	Beni-Katab	Sunnî	Ḍhâhireh
Kelbânî	Beni-Kelbân	Sunnî & Ibâḍhî	Ḍhâhireh
Kharûsî	Beni-Kharûs	Ibâḍhî	El-Ḥajar

Division—continued.

Villages or Districts.	Number of Males.	Remarks.
Wâdî 'Andâm	300	Ishmaelite.
Wâdî-Hattà	250	At feud with Nizâr.
Zikki or Izki	1,250	
Kaṣbîyet-ez-Zû'âb. Er-Rûeyleh. Elkhashdah.	400	
Semed	300	

Division.

Ja'lân. Ṣûr	1,500	At feud with Beni-bû-Hasan.
Dût	100	Kaḥtânite. At feud with the Beni-Ghâfir.
Bedouin or Nomadic	1,500	
Ten'am	2,000	
El-Ghabbî. El-'Einein. Ed-Derîz. El-'Âridh.	900	At feud with the Beni-'Ali ; the Ya'âkîb, and Beni-Kelbân. This tribe gave the name to the Ghâfirî party, previously the Nizârîyeh.
Wâdî-Beni. Ghâfir	500	
Nakhl	3,000	
Et-Tehwah. El-Hameydheh.	800	At feud with the Hejri-în.
Bedouin	800	
El-Homrâ	1,500	At feud with the Beni-Hinâh.
El-'Orakî	50	
Wâdî 'Âhin	500	At feud with the Beni-'Ali.
Kalhât. Teywî. Dhibâb and Hills.	4,000	At feud with the Beni-Rû-âheh.
Seyjeh. El-Jeyleh. Et-Tow.	2,500	Do. do.
Bedouins of desert from Jâzer west. Ṣûr.	5,000	Kaḥtânite. At feud with the Al-Wahîbeh.
Bedouins	300	
El Khadhreh	100	
El Mahdhah	2,000	At feud with the Beni-Mezrû'.
Wâdi-el-Kowr	200	
Nezwâ	1,500	At feud with the people of Nezwâ.
El-Aflâj	200	„ „ the Beni-Mezrû'.
El-Makannîyât	1,000	„ „ the Beni-Ghâfir.
Rostâk. Nakhl	300	

Ghâfirî

Names of Tribes. Adjective Form.	Names of Tribes. Collective Plural Form.	Religious Sect.	Province.
Khazeyrî	Beni-Khazeyr	Ibâdhî	El-Hajar
Koleybî	Beni-Koleyb	Sunnî	El-Hajar
Mahârabî	Beni-Mahâreb	Ibâdhî	El-Hajar
Makbâlî	El-Makâbîl	Sunnî	El-Hajar
Makheyrekî	El-Makhârek	Ibâdhî	'Omân
Mejlebî	Beni-Mejleb	„	'Omân
Meskerî	El-Mesâkereh	„	Sharkîyeh
Mezrû'î	Beni-Mezrû'	„	El-Hajar
Nadâbî	En-Nadâbî-în	„	El-Hajar
Na'îmî	En-Na'îm	Sunnî	Dhâhireh
Do.	Do.	„	El-Jow
Nebhânî	Beni-Nebhán	Ibâdhî	El-Hajar
Nizârî	En-Nizar	„	'Omân
Omarî	Beni-'Omar	Sunnî	Dhâhireh
Do.	Do.	Ibâdhî	El-Hajar
Do.	Do.	„	Bâtineh
Râ-îsî	Er-Râîveseh	Sunnî	El-Hajar
Râsîbî	Beni-Râsib	„	Sharkîyeh
Rehbî	Er-Rehbî-în	Ibâdhî	El-Hajar
Rîyâmî	Beni-Rîyâm	„	'Omân
Sa'adî	Beni-Sa'adah	Sunnî	Dhâhireh
Shakeylî	Beni-Shakeyl	Ibâdhî	'Omân
Do.	Do.	„	Dhâhireh
Sharkî	Esh-Sharkî-în	Sunnî	El-Hajar
Sîâbî	Es-Sîâbî-în	Ibâhdî	El-Hajar
Sinânî	Beni-Sinân	Sunnî	Sharkîyeh
Subhî	Beni-Subh	„	El-Hajar
Ya'kûbî	El-Ya'âkîb	„	Dhâhireh
Ya'rabî	El-Ya'ârabeh	Ibâdhî	El-Hajar
Zîdî	Beni-Zîd	Ibâdhî & Sunnî	Dhâhireh

Division—continued.

Villages or Districts.	Number of Males.	Remarks.
Nakhl	200	
Wâdî-el-Jezzi	1,000	
Wâdî-Semâîl	100	
Near Ṣohar	1,000	
Adam	750	At feud with the Al-bû-Saʿid.
Semâîl	50	
Ibrâ, el-Yehmadî	1,500	At feud with the Harth.
Rostâk. Semâîl	100	„ „ the Beni-Kaʿb and Beni-Kaṭab.
Wâdî-el-ʿAkk	2,000	„ „ the Habûs.
Dhank. El-Kâbil	1,500	„ „ the Beni-Yâs. Kaḥtânite.
Bereymî Asʿaṛah. Hafît	1,500	
Bûsher. Semâîl	100	Kaḥtânite. This family furnished Princes of ʿOmân from 13th to 15th century.
Zikki or Izki	1,250	At feud with the Yemen and Beni-Rû-âheh.
El-Heiyâl	1,000	At feud with the Howâsineh and Maḳâbil.
Wâdî-el-Howâsineh	1,000	
El-Gheyzein. Ghadhfân. El-Asrar.	1,000	
El-Fazekh	1,000	
El-Wâfî	200	At feud with the Beni-bû-Hasan.
Wâdî-baʿd. Kaḥzah	2,000	„ „ Habûs.
Jebel-el-Akhdhar	2,000	„ „ Beni-Rû-âheh.
Dût'	100	„ „ Beni-Ghâfir.
Seifan. El-Bâsîyeh	700	„ „ ʿIbri-în.
El-Ghabbî. Khadal	400	
Wâdî-Hâm	200	
Nafʿah	1,500	At feud with the Hadâdebeh, Beni ʿArâbeh, and Beni Battâsh.
Ṣûr	500	
Abyadh	300	
ʿObrî	1,000	Kahtânite. At feud with Beni-Ghâfir.
Rostâk. Nakhl	100	This family furnished Imâms of ʿOmân in 17th and 18th centuries.
Fadâ	100	At feud with Beni-Ghâfir.

Key to Pronunciation and Transliteration.

Form.	Sound.	Arabic.	Form.	Sound.	Arabic.
A	a in beggar...	Short vowels.	TH	th in both.....	ث
E	e in bed.....		T̲H	th in the	ذ
I	i in bid		K̲H	ch in loch.....	خ
O	o in obey ...		G̲H	g in Sagen (German)	غ
U	u in bull.....		D̲H	d hard	ظ—ض
A	a in father ...	Long do.	Ḥ	strong h	ح
Î	ee in deed ...		Ṣ	s sibilant	ص
Ô	o in note.....		Ṭ	t hard	ط
Û	oo in boot ...		K̇	k do.	ق
EI	y in by	Diphthongs.	Y	y in yes	ى
EY	ey in they ...		'	not describable	ع
OW	ow in cow.....		,	ellipse of vowel	

Notes.

Hinâwî in general indicates the Kahtanite tribes, descendants of Yemen Arabs.

G̲hâfirî „ „ Ishmaelite „ „ Nejd „

Some exceptions are noted in columns of Remarks.

Sub-tribes are not specified. Persian and Beluch tribes are omitted.

The following Geographical Divisions are termed Provinces:—1, Esh-shark̲îyeh (the East), including Ja'lân. 2, 'Omân. 3, Edh-D̲hâhireh. 4, El-Bâṭineh. 5, El-Jow, containing Bereymî. 6, El-Ḥajar or El-Hujur, the hilly districts between Bâṭineh and D̲hâhireh, including the Wâdîs or passes.

The tribes of Shemâl districts, bordering the Persian Gulf, are not in this table.

The form Beni, vulg. for Benu, is adopted, as being in universal use in 'Omân.

The Table is compiled from information of Native Arabs.

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